

ANATOMY

NEET PG - 2018

Handwritten Note

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Subject: Anatomy



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ANATOMY

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SUPERIOR EXTREMITY

The Pectoral Region

Pectoralis Major

Origin \Rightarrow Medial 2/3rd of the clavicle;
Manubrium & Body of sternum;
2nd-6th costal cartilage;
External oblique aponeurosis;

Insertion \Rightarrow Lateral lip of Bicipital groove of Humerus

Action \Rightarrow Adduction
Flexion
Medial Rotation @ the shoulder joint

N. Supply \Rightarrow Medial & Lateral Pectoral Nerve (Composite / Hybrid Nerve)

Blood supply \Rightarrow Superior thoracic A.
Lateral thoracic A. } \rightarrow Branches of Axillary A.
Thoracoacromial A.

Perforating branch of internal thoracic A

Anterior intercostal A

Q. M/c muscle to be congenitally absent

\downarrow
Pectoralis Major (Poland Syndrome)
(Sternocostal part).

Cruciate Muscle

\downarrow
Muscle fibres cross in letter
"X"
eg \Rightarrow Pectoralis Major;
Sternocleidomastoid;
Masseter.

eg \Rightarrow Pectoralis Major

Flexor Pollicis Brevis \rightarrow Superficial head

\downarrow sublin
Deep head Medi

\downarrow supplied by
deep br of ulnar

Flexor digitorum profundus

Brachialis

Lesser tubercle of Humerus \Rightarrow "Subscapularis" Muscle attaches
 \Downarrow
Medial Rotation @ Shoulder joint

Greater tubercle of Humerus \Rightarrow

① Supraspinatus \Rightarrow Abduction (0° to 15°)

② Infraspinatus \Rightarrow } Lateral Rotation

③ Teres Minor \Rightarrow }

④ Coracohumeral Ligament

Forgotten Muscle of Rotator cuff \Rightarrow Subscapularis

Lateral lip of Bicipital groove \Rightarrow Pectoralis Major

Medial lip of Bicipital groove \Rightarrow Teres Major Attaches

Floor of
In the V Bicipital groove \Rightarrow Lattismus dorsi

• Long head of biceps brachii \bar{c} the
Synovial sheath of shoulder joint

• Ascending branch of Anterior
chamfer humeral Artery

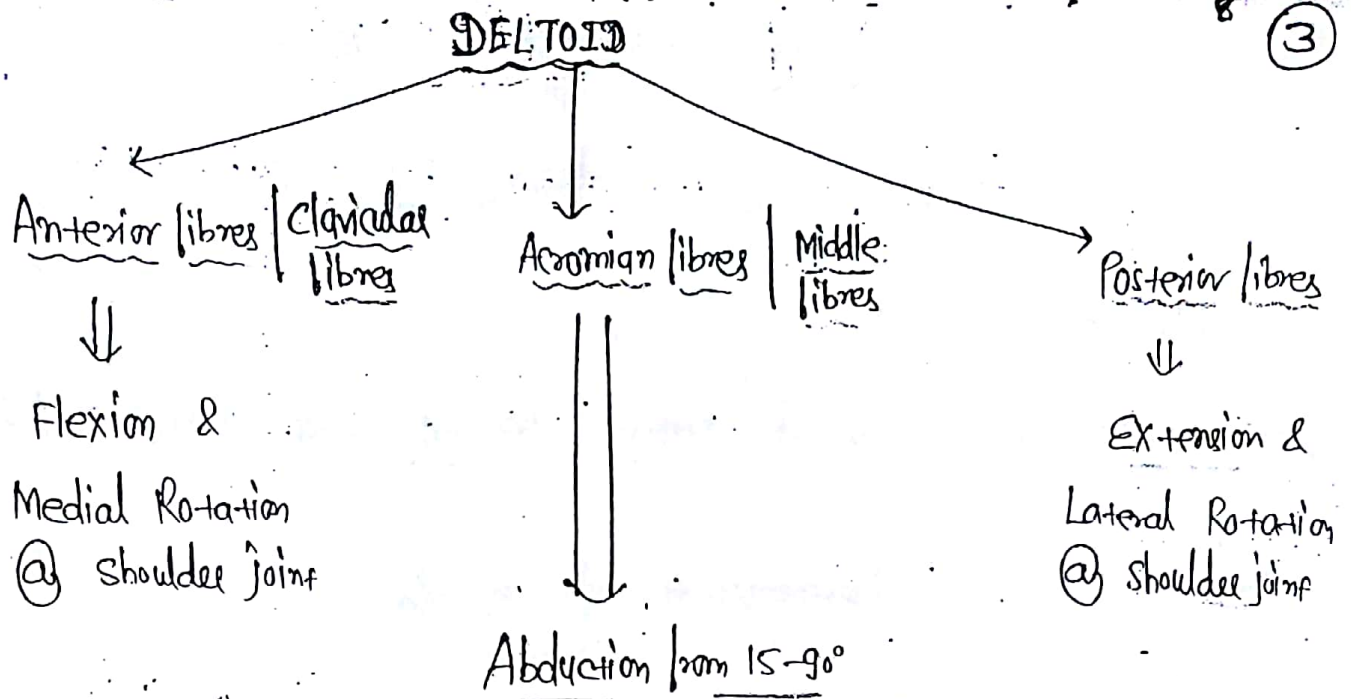
Rotator cuff \Rightarrow Subscapularis

Infraspinatus

Teres Minor

Supraspinatus

(M/c muscle to be damaged in Rotator cuff)



- Axillary Nerve Supplies — Deltoid

Tells Minor

- gives some cutaneous branch

Upper Lateral cutaneous N. of Arm

↳ "Regimenbach Sign"

Abduction @ Shoulder joint

0°-15° / Initiation of Abduction ⇒ Supra spinatus

15°-90° ⇒ Acromial fibres of deltoid

90° or above / overhead Abduction ⇒ Serratus Anterior

Trapezius (Lower fibres)

Lateral Rotation of scapula

SERRATUS ANTERIOR (Boxer Muscle)

- Origin - Arises from the Lateral aspect of upper 8 Ribs as digitation.
- Insertion - costal aspect Medial border of the Scapula
- Action - Protraction of Scapula
↳ it Means "Abduction"
- N. Supply - Long Thoracic Nerve / N. to Serratus Anterior

Q. Winging of Scapula is d/t paralysis of ⇒

Serratus Anterior (on attempting Movement)
Trapezius (@ Rest)

Q. Retraction of Scapula is done by ⇒

Rhomboides Minor

Rhomboides Major

Middle fibres of Trapezius

(a,b,c) Q. True about Abduction @ shoulder joint -

- Musculo-tendinous cuff stabilizes shoulder joint
- Supraspinatus initiates Abduction
- Serratus Anterior & Trapezius also help in Abduction
- Multipennate deltoid clavicular fibres is Main Abductor
- Axillary N. injury has No effect on Abduction

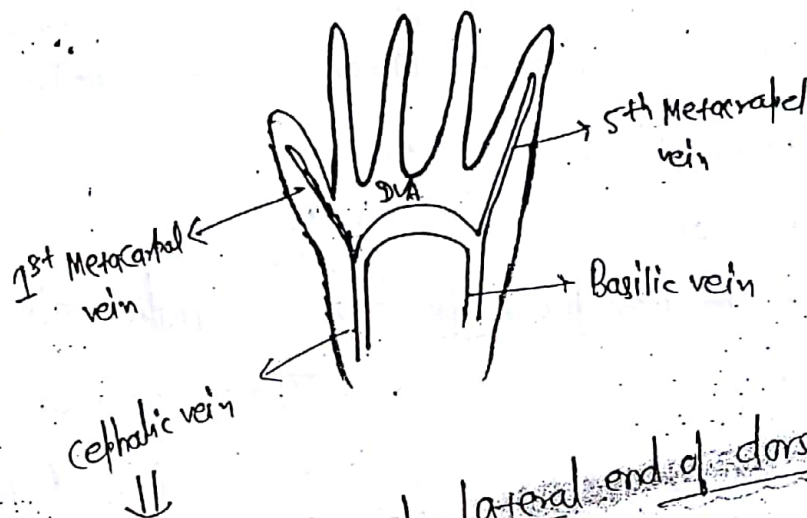
Structure lying in Deltpectoral groove

Cephalic vein

Structure lying in the ilio-psoas groove \Rightarrow Femoral Nerve

Structure lying in the Tracheo-oesophageal groove \Rightarrow Recurrent Laryngeal Nerve

Cephalic vein



DVA \Rightarrow Dorsal venous Arch

Formed by joining of lateral end of dorsal venous arch with the 1st Metacarpal vein

Lies in the Roof of Anatomical Snuff box.

Lies in deltpectoral groove

Pierces the clavipectoral fascia

Drains into the Axilla

Basilic vein

- Formed by joining of Medial end of dorso-venous arch & the 5th Metacarpal vein.
- It joins Vene comitans (of a. brach) around the brachial artery & forms axillary vein.

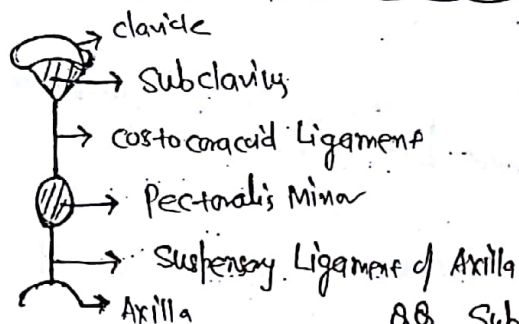
V.V.Qs Clavi-pectoral fascia

- begins from the clavicle & inserted into the axilla;
- encloses 2 Muscle
 - Subclavius
 - Pectoralis Minor
- Part of fascia b/w Subclavius & Pectoralis Minor is k/w "Costo-coracoid Ligament"

∴ Part b/w Pectoralis the axilla is k/w "Suspensory Ligament"

- derived from "Costo-coracoid Ligament"

Structure piercing the clavi-pectoral fascia → • Cephalic vein



- Thoraco-acromial Artery
- Lateral Pectoral Nerve
- Lymphatics from breast

∴ Subclavius protects underlying brachial plexus & subclavian vessels from a broken clavicle.

Coraco-clavicular Ligament → two parts

Conoid (Medial)

Trapezoid (Lateral)

The weight of upper limb is transmitted to the medial 2/3rd of the clavicle & then to the axial skeleton through Coraco-clavicular Ligament.

THE AXILLA

⑤

Boundaries ⇒

Anterior wall

Pectoralis Major

Pectoralis Minor

Subclavius

Posterior wall

Subscapularis

Teres Major

Lattismus dorsi

(causes extension;
Adduction &

Medial Rotation @ the
Shoulder joint)

- also k/a "Climber's Muscle"

Medial wall

Ribs

Serratus Anterior

Lateral wall

Humerus

Coracobrachialis

Apex of A

- axillary canal

Anteriorly

↳ clavicle

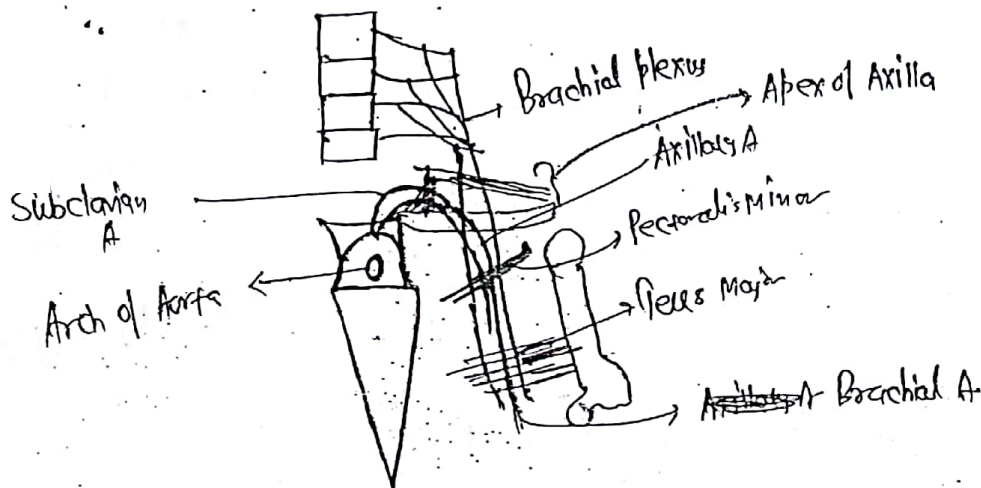
Medial

↳ outer border of 1st Rib

Posteriorly

↳ Scapula (subscapularis)

- * Axillary A. is divided into 3 parts by \Rightarrow Pectoralis Minor Muscle
- Subclavian A. is divided into 3 parts by \Rightarrow Scalenus Anterior Muscle
- Maxillary A. is divided into 3 parts by \Rightarrow Lateral Pterygoid Muscle
- Lingual A. is divided into 3 parts by \Rightarrow Hyoglossus Muscle



Axillary Artery

Continuation of the Subclavian Artery at outer border of the 1st Rib

Continues as Brachial Artery below the lower border of Teres Major.

Divided into 3 parts by Pectoralis Minor

Branches \Rightarrow 1st part \Rightarrow Superior thoracic A.

2nd part \Rightarrow Lateral thoracic A.
(chief A. supplying the breast)

Thoracoacromial A.

2nd Part

⇒

Anterior circumflex humeral A.

Posterior circumflex humeral A.

Both form
Anastomosis
around surgical
neck

Subscapular A.



It gives branches

Circumflex scapular

A.

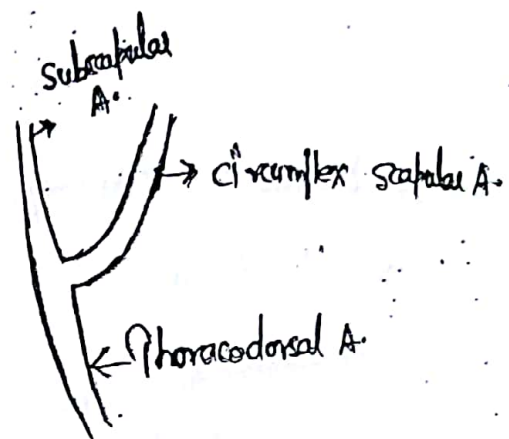
↳ Passes through

Upper A. Space & takes

part in Anastomosis

on the dorsal aspect

of Scapula.



Continuation of Subscapular A. ⇒ Thoracodorsal A.



Accompanies the thoracodorsal N. / N. of Latissimus

Anastomosis on the dorsal Aspect of Scapula

Subclavian



1st Part

Subscapular A.

Deep branch of
Transverse cervical A.

Axillary



IIIrd Part

Subscapular / Circumflex scapular

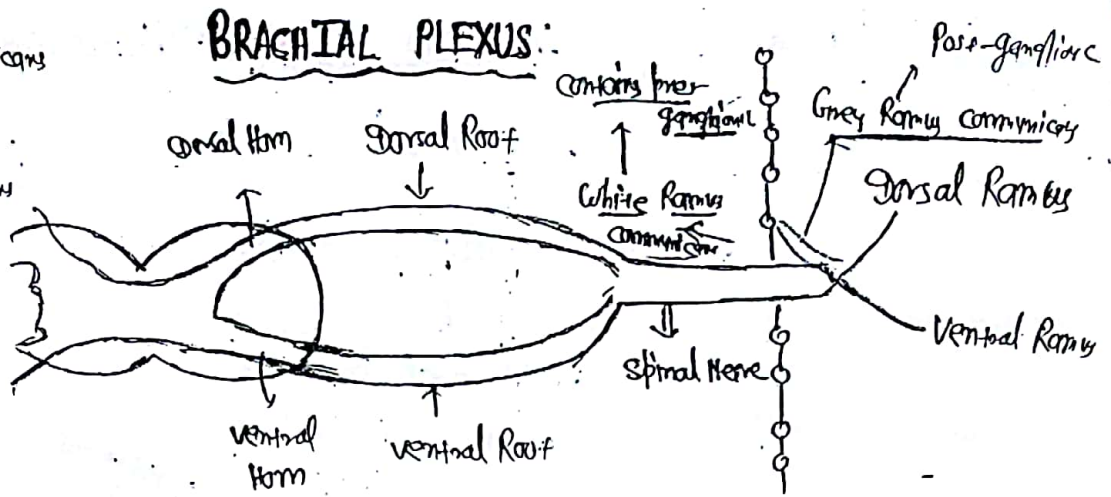
White Ramus communicans

⊕ In T₁-L₂

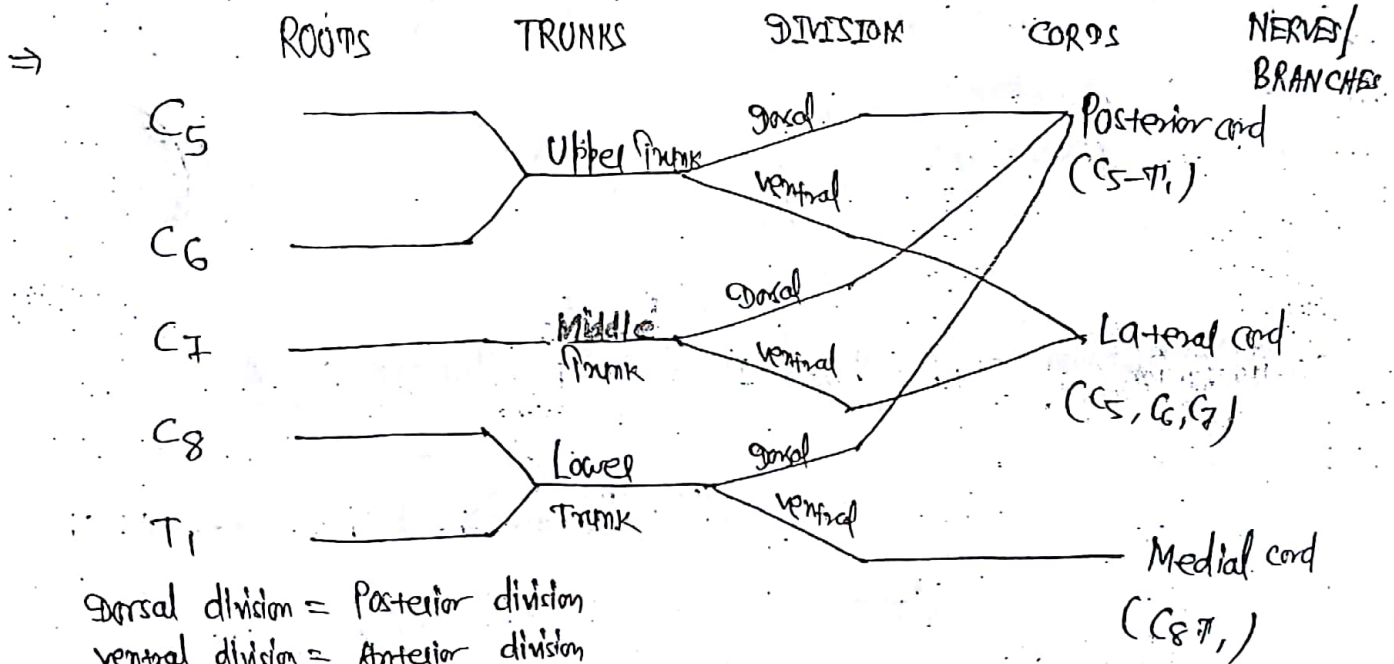
Grey Ramus communicans

⊕ in all the spinal Nerve

BRACHIAL PLEXUS:



⇒ A plexus is formed by Ventral Ramus of the corresponding spinal Nerve.



Dorsal division = Posterior division

Ventral division = Anterior division

Branches of Lateral cord ⇒

① Lateral Pectoral N. (C5, C6, C7)

② Lateral Root of Median N. (C5, C6, C7)

③ Musculocutaneous N. (C5, C6, C7)

↳ Damage to Musculocutaneous Nerve

⊕ Weakness of flexion of elbow

⊕ Loss of supination of semiflexed elbow

⊕ Sensory loss along the lateral border of forearm

Branches of Medial cord \Rightarrow

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- ① Medial Pectoral N. (C_8, T_1)
- ② Medial Root of Median N. (C_8, T_1)
- ③ Medial cutaneous N. of Arm (C_8, T_1)
- ④ Medial cutaneous N. of Forearm (C_8, T_1)
- ⑤ Ulnar Nerve (C_7, C_8, T_1)

Branches of Posterior cord \Rightarrow

"ULNAR"

- ① Upper Subscapular N. \rightarrow supplies subscapularis only
- ② Lower Subscapular N. \rightarrow C_5, C_6 supplies subscapularis & Teres Major
- ③ Axillary N. \rightarrow supplies both Teres Minor & Deltoid
- ④ N. to Latissimus dorsi / Thoraco dorsal N. (C_6, C_7, C_8)
- ⑤ Radial Nerve ($C_5 - T_1$)
 \hookrightarrow Largest branch of Brachial plexus

Q. Root value of Median Nerve $\Rightarrow C_5, C_6, C_7, C_8, T_1, (C_5 - T_1)$

Branches from the Roots

C_5 Root \Rightarrow N. to Rhomboides / Dorsal-scapular Nerve

C_5, C_6, C_7 Root \Rightarrow N. to Serratus Anterior / Long thoracic Nerve (C_5, C_6, C_7)

C_5 Root \Rightarrow Accessory Phrenic Nerve (joins the Main Phrenic N. through N. to Subclavius)

C_5, C_6 Roots \Rightarrow N. to Subclavius

Branches from Upper trunk

- ① Supra Scapular Nerve - supplies Supraspinatus & Infraspinatus
- ② N. to Subclavius (occasionally from roots of C₅, C₆)

* Roots; trunks; & divisions are \Rightarrow Subclavicular;



Lies in Posterior triangle of the Neck between the Scalenus Anterior & Scalenus Medius.

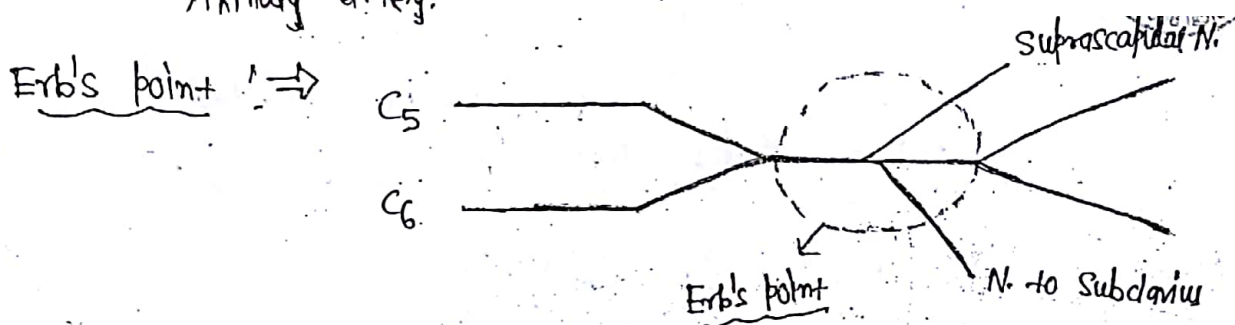
* Cords & Nerves are \Rightarrow Infradavicular



Lies in the Axilla around the axillary artery.

* Cords are present in the 1st & 2nd part; Nerves are present in 3rd part of Axillary Artery.

* cords are placed in Affc to their Name in 2nd part of Axillary artery.



* Pre-fixed Brachial plexus \Rightarrow Formed from C₄₋₈ Spinal Nerve

* Post-fixed Brachial plexus \Rightarrow Formed from C₆₋₈ T₁₋₂ Spinal Nerve

FRONT OF THE ARM / FRONT OF THE BRACHIUM

Muscles

⇒ 1.

Biceps brachii

Short head - Arises from coracoid process along with coracobrachialis

Long head

↓
Arises from subglenoid tubercle of scapula.

Insertion ⇒ Posterior aspect of Radial tuberosity

N. Supply ⇒ Musculocutaneous Nerve (C5, C6)

Not C7 (X)

Action ⇒

Supinator @ Radioulnar joint

Flexion @ elbow joint

Flexion @ shoulder joint

* Supination in extended elbow

↓
Supinator

* Supination in flexed elbow

↓
Biceps brachii

2. Brachialis ⇒ Arises from the shaft of humerus below the insertion of coracobrachialis

Insertion ⇒ ulnar tuberosity

N. Supply ⇒ Medial half ⇒ Musculocutaneous N. (C5, C6)

Lateral half ⇒ Radial N. (C5, C6)

Action ⇒

Chief flexor of the elbow joint

3. Coracobrachialis \Rightarrow Arises from the coracoid process along with the short head of biceps brachii.

Insertion \Rightarrow Medial aspect of middle of shaft of the humerus.

N. Supply \Rightarrow Musculocutaneous Nerve (C5, C6, C7)

Action \Rightarrow Weak flexors of the shoulder joint.

*QA Paralysis after injury to C5,6 except \Rightarrow Coracobrachialis

Musculocutaneous Nerve

Branch of Lateral cord of Brachial plexus.

pt. on the Lateral aspect of 1st part of Axillary A.

- pierces the coracobrachialis.
- Lies b/w biceps & Brachialis.
- Continues as the Lateral cutaneous N. of Forearm.

ERB'S PARALYSIS

- Injury to the upper trunk
- N. Roots involved \Rightarrow C5, C6
- Nerves involved \Rightarrow Axillary N.
Musculocutaneous N.
Subscapular N.
N. to Subclavius

Muscle Paralysed

Position of upper Limb

- ① Axillary Nerve \Rightarrow Deltoid \rightarrow Arm is adducted
Tee Minor \rightarrow Arm is Medially Rotate
 \downarrow
"Regimen bath sign"

- ② Musculocutaneous Nerve \Rightarrow Biceps \rightarrow Forearm is pronated
Brachialis \rightarrow Forearm is extended
— Loss of sensation on lateral aspect of Forearm.
* "Coraco-brachialis" is shared b/c it is supplied by C₅ of Musculo-cutaneous

- ③ Suprascapular N. \Rightarrow Supraspinatus \rightarrow Arm is adducted
Infraspinatus \rightarrow Arm is Medially Rotate

KLUMPKER'S PARALYSIS

- Injury to Lower trunk.
- N. Roots Involved \Rightarrow C₈ T₁
- N. Involved \Rightarrow Median & Ulnar N.
- Muscle Paralysed \Rightarrow Intrinsic Muscle of Hand (T₁)
Ulnar flexors of the wrist & fingers (C₈)
↳ Flexor carpi ulnaris & Medial half Flexor digitorum profundus.
- claw hand & Horner syndrome

FRONT OF THE FOREARM

(Lateral to Medial)
SUPERFICIAL MUSCLE

⇒ 1. Pronator teres

Origin of all 5 Muscles
are from Medial epicondyle
of Humerus.

Superficial head/
Humeral head

Deep head/
Ulnar head

Median N. Passes b/w two heads.

Ulnar A. Passes deep to the deep head.

Deep head separates Median N. from Ulnar A.

2. Flexor carpi Radialis

Causes Flexion & Abduction @ Wrist joint.

3. Palmaris Longus

— Continues in hand as "Palmar Aponeurosis"

4. Flexor digitorum superficialis

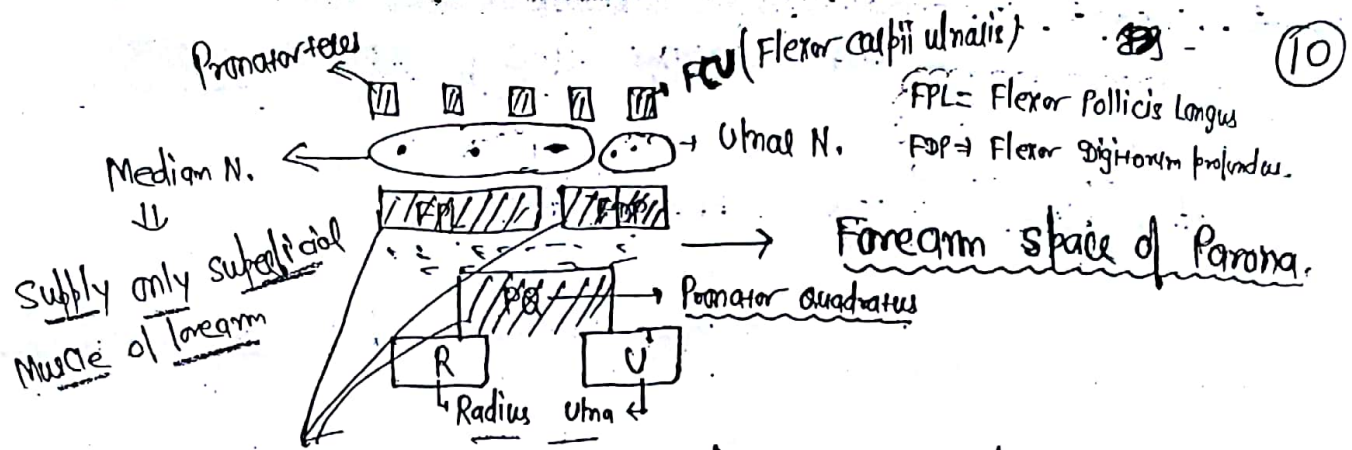
5. Flexor carpi Ulnaris

— Causes Flexion & Adduction @ Wrist joint.

Intermediate Muscle ⇒ 1. Flexor Pollicis longus - Arises from Radius

2. Flexor digitorum profundus - Arises from Ulna

Deep Muscle ⇒ Pronator quadratus



Anterior Interosseous Nerve \Rightarrow Supply Lateral half of Flexor digitorum profundus.

\hookrightarrow Deep branch of Median N.
 given after it passes b/w
 2 heads of Pronator teres.

\hookrightarrow Flexor pollicis longus; Pronator quadratus & Lateral half of Flexor digitorum profundus are supplied by Anterior Interosseous Nerve.

* Carpel-tunnel syndrome \Rightarrow Seen when Median Nerve is compressed.

\Downarrow
 Carpel-tunnel contains \rightarrow Median Nerve + 9 tendons

$\Delta x \Rightarrow$ Phalen's test; Tinel's sign.

4 FDS + 4 FDP + 1 FPL

* Pronator teres syndrome \Rightarrow Uncommon entrapment of the Median Nerve occurring in the elbow region.

* Ulnar Nerve enters the forearm by passing b/w the two (Humeral & Ulnar) heads of origin of Flexor carpi ulnaris.

* Froment's sign \Rightarrow For Adductor pollicis \Rightarrow Seen in ulnar N. injury.

* Card Test \Rightarrow For Palmar Interossei (Adductors of fingers) \rightarrow seen in ulnar N. injury.

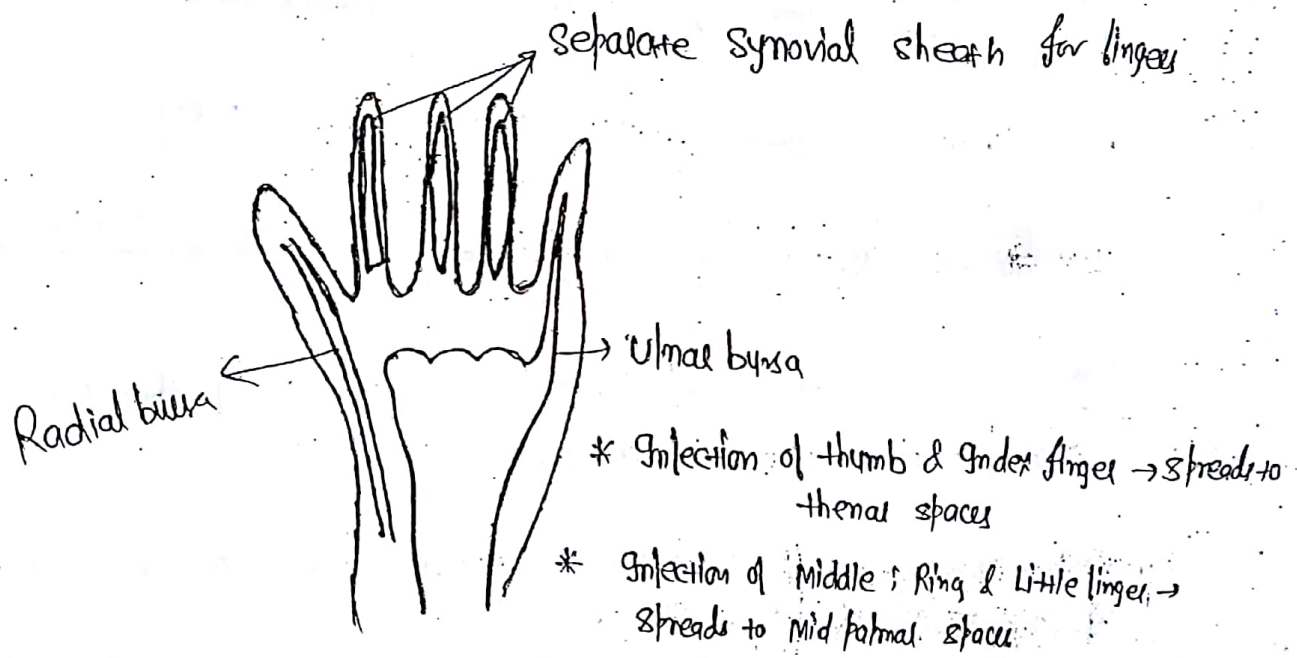
* claw hand is caused by lesion of \Rightarrow Ulnar N. > Median N.

* Guyon's canal syndrome / Handball Palsy \Rightarrow caused by entrapment of the Ulnar Nerve in Guyon's canal.

FLEXOR RETINACULUM & CARPEL TUNNEL

- Ulnar bursa encloses the tendon of
 - ↳ Flexor digitorum superficialis & Profundus.
 - ↳ Continues in Little finger.

- Radial bursa encloses the tendon of
 - ↳ Flexor pollicis Longus
 - ↳ Continues in thumb.

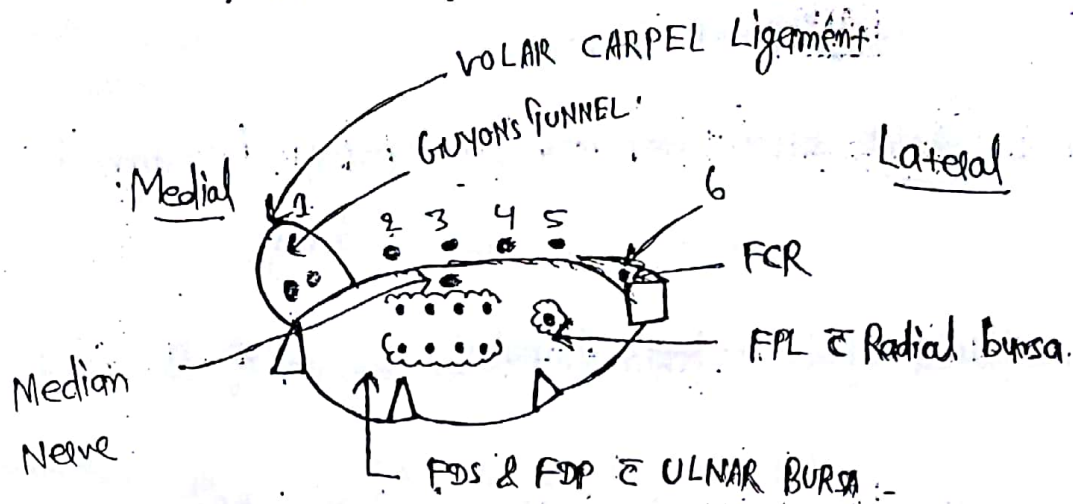


* Structures passing Above Flexor Retinaculum ⇒

- 1. Ulnar Nerve & vessels
 - ↳ passes below the volar carpal Ligament through Guyon's canal.

2. Palmar cutaneous branch of Ulnar Nerve

- ↳ Supplies the skin over the hypothenar eminence



3. Palmaris Longus

4. Palmar cutaneous

↳ Supplies

5. Superficial palmar branch of

6. Flexor carpi Radialis.

ULNAR ARTERY ⇒ Largest terminal branch of Brachial Artery; arising in cubital fossa, enters the palm by passing superficial to flexor Retinaculum.

Branches → (A) In cubital fossa ⇒ i) Anterior ulnar Recurrent;

ii) Posterior ulnar Recurrent; Anterior interosseous
iii) Common interosseous → Posterior interosseous.

3) In Forearm ⇒ i) Palmar carpal branch
ii) Dorsal carpal branch

In Palm ⇒ i) Deep branch
ii) Superficial branch

*

REFLEX & GTS ROOT VALUE

Biceps Reflex → C₅, C₆

Supinator Reflex → C₅, C₆

Triceps Jerk → C₆, C₇

Knee Jerk → L₂, L₃, L₄

Ankle Reflex → S₁.

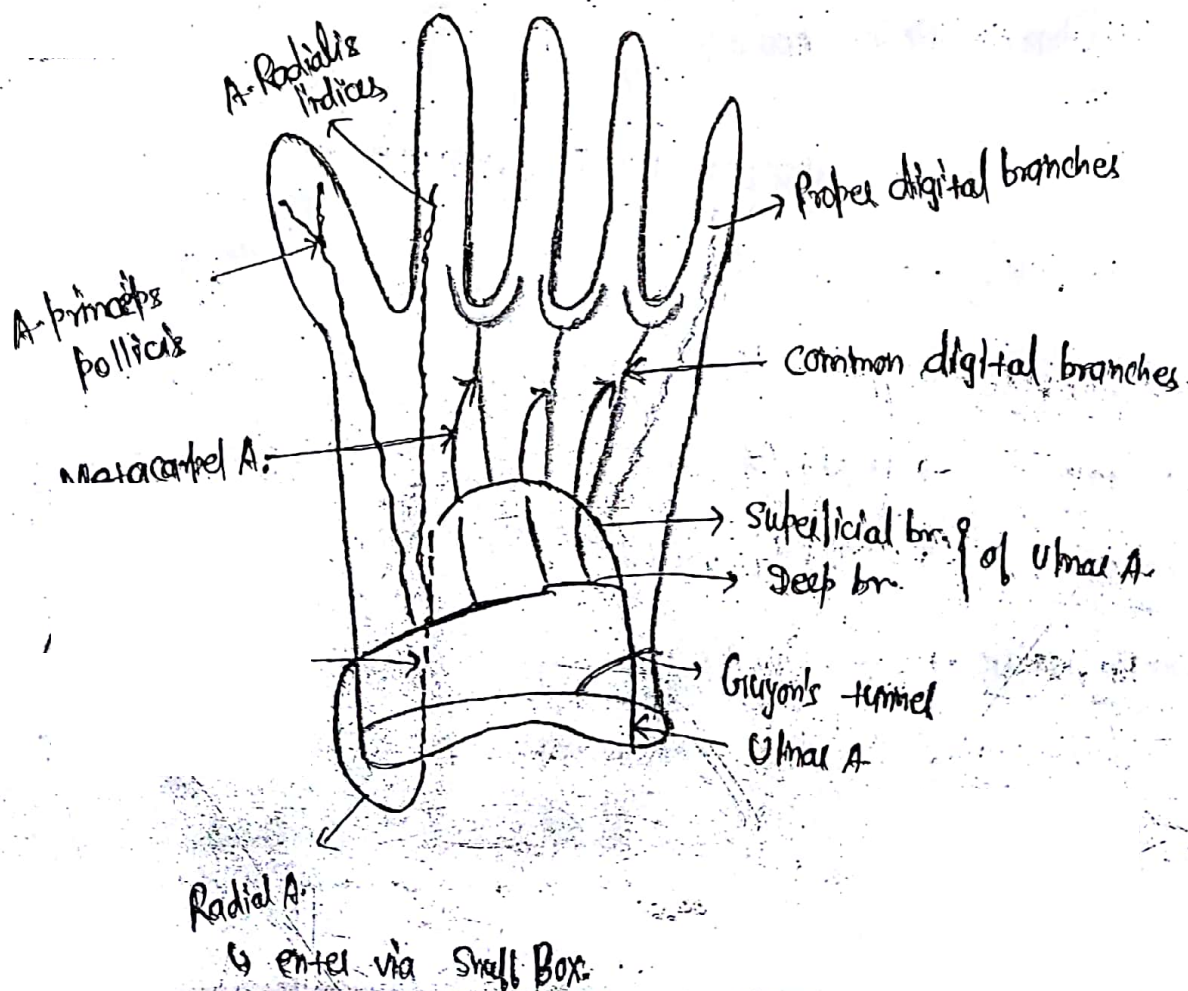
HAND

SUPERFICIAL PALMAR ARCH \Rightarrow formed by superficial branch of Ulnar Artery.

Completed by superficial palmar branch of Radial A.

- Lies above the flexor tendons (FDS, FDP).
- Lies @ the level of distal palmar crease.
- Branches \Rightarrow
 - i) 3 Common digital branches.
 - ii) 1 Proper digital branches.

Supplies \Rightarrow Medial 3 $\frac{1}{2}$ fingers.



Deep palmar Arch \Rightarrow Formed by Radial A.

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(12)

— Completed by deep branch of Ulnar A.

— Lies deep to the tendons of FDS; FDP

— Lies 1 cm proximal to Superficial palmar arch

Branches \Rightarrow

i) Arteria princeps pollicis;

ii) Arteria Radialis indicis;

iii) 3 Metacarpal Arteria which anastomose to

3 common digital branches of superficial palmar arch.

\rightarrow divides into 4 tendons for 4 fingers opposite to the base of Proximal Phalanx.

⊗

The tendon of Flexor digitorum superficialis is inserted on either side of base of Middle phalanx of the fingers.
 \rightarrow each tendon divides into 2 slips.

⊗

The tendon of Flexor digitorum profundus is inserted on base of distal phalanx of the fingers.

\rightarrow Causes flexion of DIP joint;

LUMBRICALS \Rightarrow Flex the Metacarpophalangeal joint & extend Interphalangeal joints.

— Inserted on \Rightarrow the lateral aspect of the base of Proximal phalanx of the fingers.

\Rightarrow Dorsal aspect of the base of distal phalanx of fingers.

N. Supply \Rightarrow

1st & 2nd Lumbricals \Rightarrow Median N.

3rd & 4th Lumbricals \Rightarrow Ulnar N. (Deep branch)

Action \Rightarrow Flexion @ MP Joint

Extension @ IP Joint

* Paralysis Leads to claw hand,

* Muscles supplied by Median N. in the Hand \Rightarrow 5 Muscles

Abductor pollicis brevis

Flexor pollicis brevis (Superficial head)

Opponeus pollicis

1st & 2nd Lumbricals

Grip of the hand is due to \Rightarrow Flexor tendons (Long)

* Muscles supplied by Ulnar N. in the Hand \Rightarrow 15 Muscles

Abductor digiti minimi brevis

Flexor digiti minimi brevis

Opponeus digiti minimi

3rd & 4th Lumbricals

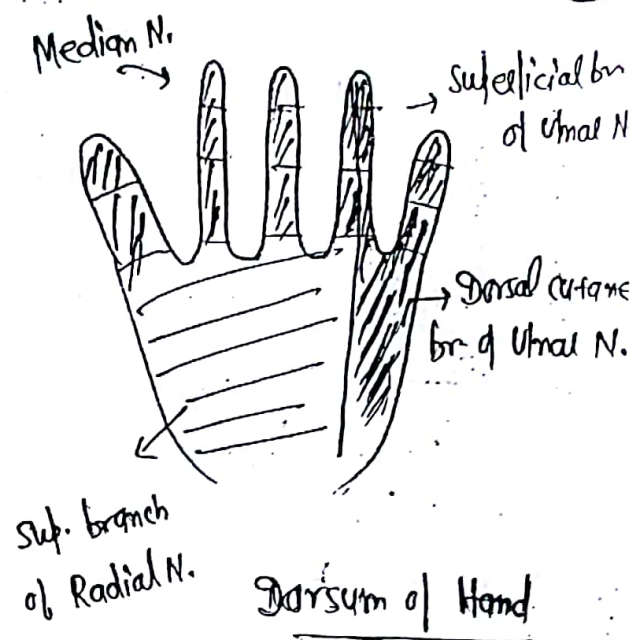
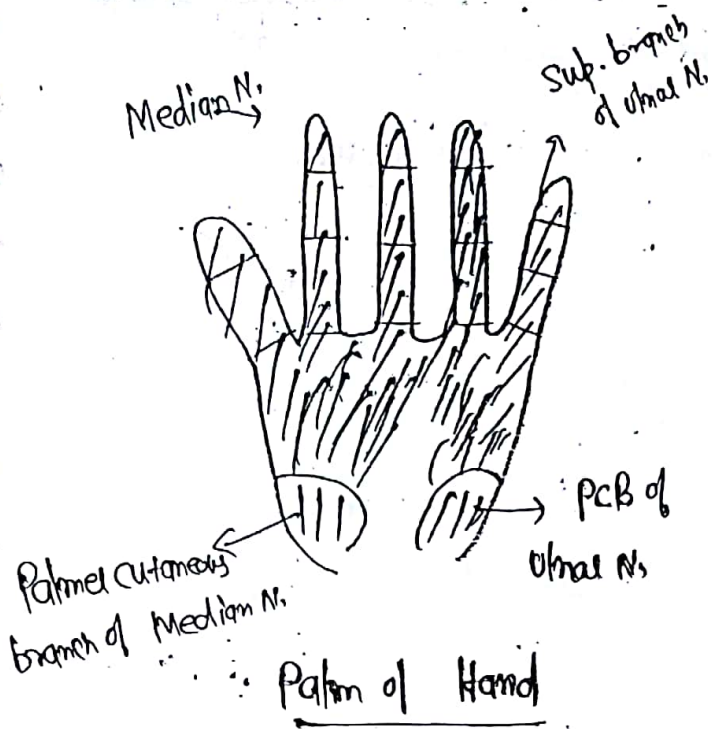
4 Palmar Interossei (Adduction of fingers)

4 Dorsal Interossei (Abduction of fingers)

Adductor pollicis (Giveyard of Ulnar N.)

Deep head of Flexor pollicis brevis

* Superficial branch of Ulnar N. supplies \Rightarrow Palmaris brevis



eye of the Hand is which Nerve \Rightarrow Median N.

eye finger of Hand \Rightarrow Index finger
(Max^m photoreceptor \Rightarrow \oplus)

Ulnar Nerve \Rightarrow Muscular Nerve

as "Labourer's Nerve"

The superficial & deep branches of Ulnar N. is given in Hand.

The Palmar cutaneous branch & dorsal cutaneous branch are given in the forearm / @ the wrist / before the Flexor Retinaculum.

* Wartenberg's sign \Rightarrow Inability to adduct the Small finger in again the Ring finger d/t weakness of Palmar Interossei Muscle

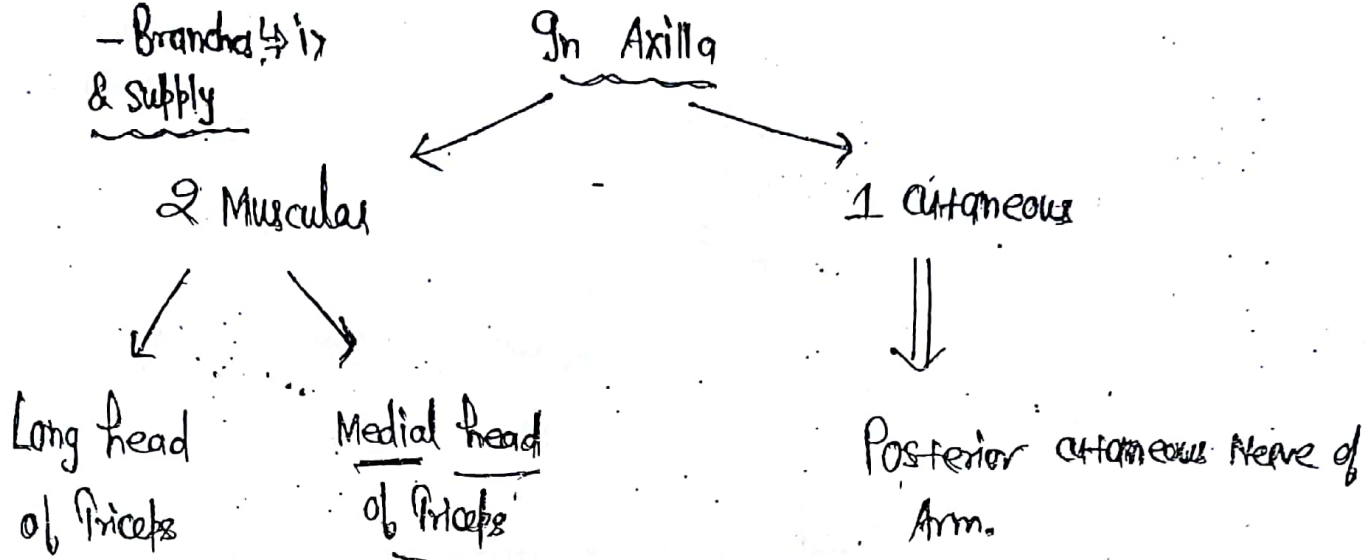
* All Metacarpals (except 1st) have \Rightarrow Distal (Head epiphysis)

* 1st Metacarpals & all phalanges have \Rightarrow Proximal (Base epiphysis)

RADIAL NERVE (Saturday Night Palsy)

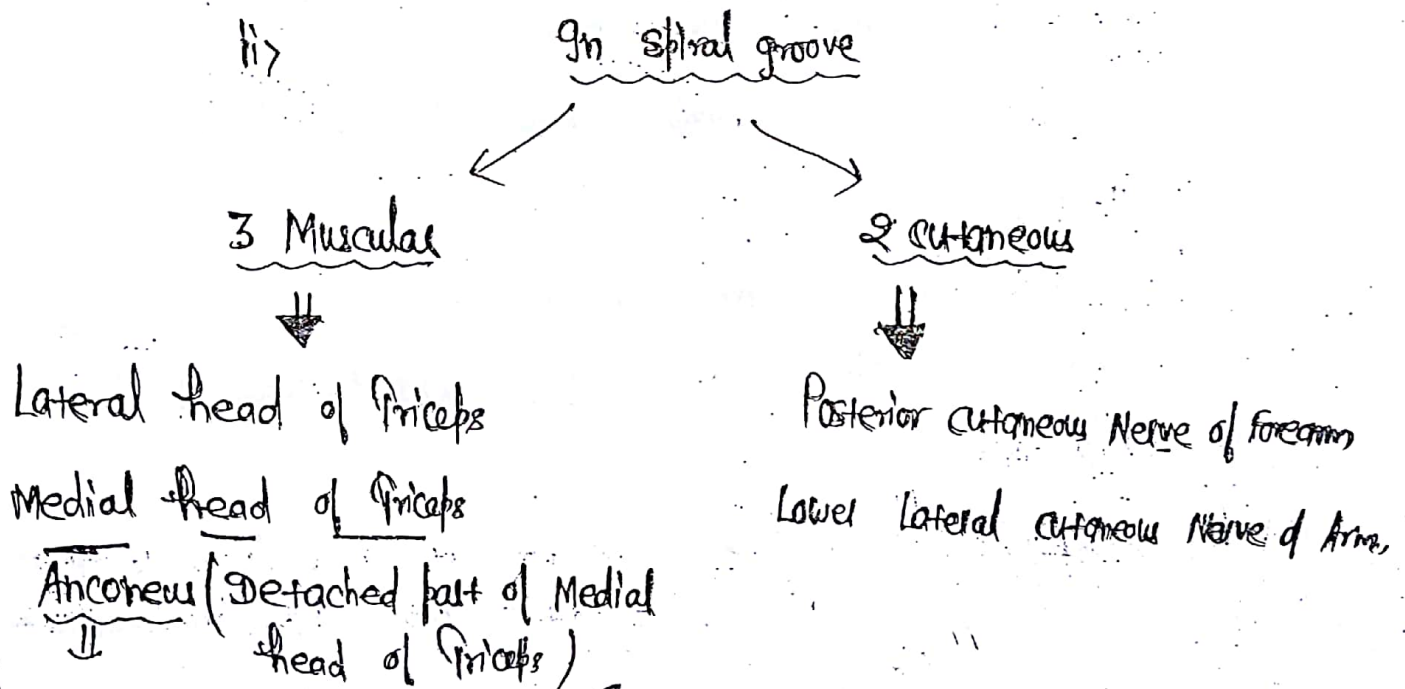
- Branch of Posterior and of Brachial plexus.
- prts. on Posterior aspect of 3rd part of Axillary A.

- Branches \Rightarrow i)
& supply

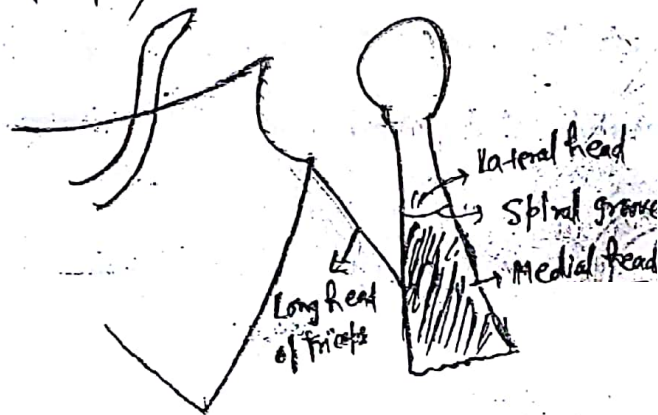


ii)

In spiral groove



help in screwing
Movement; helps
triceps to extend
elbow joint.



iii)

Lateral aspect of the Arm

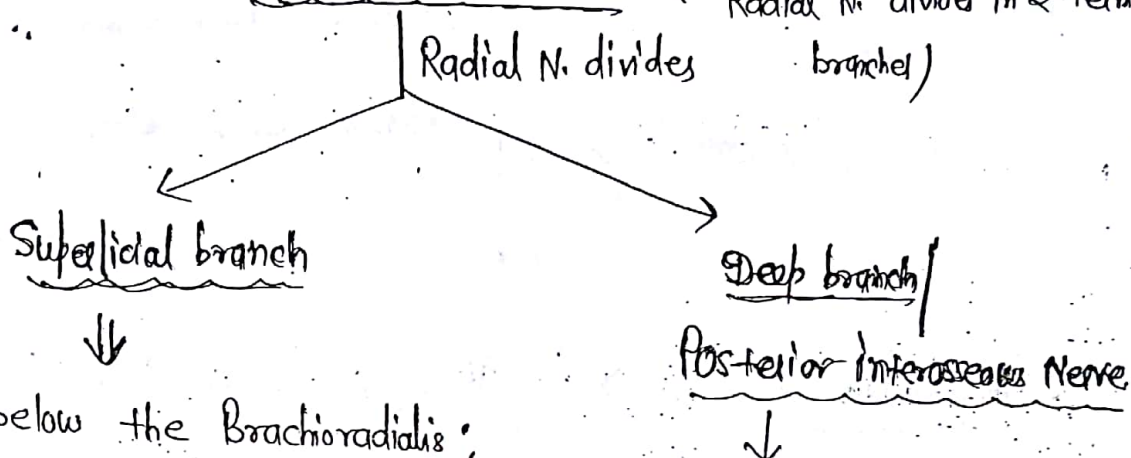
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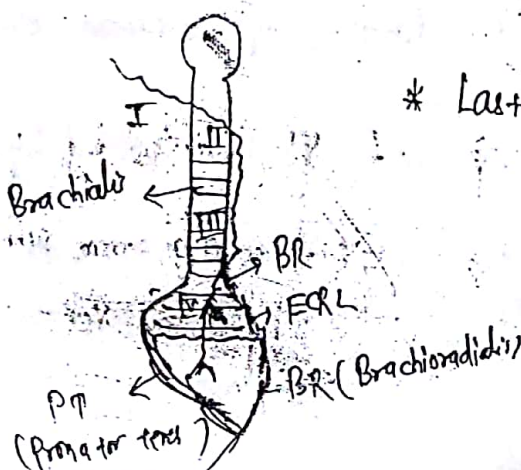
- Brachialis (Lateral hall)
- Brachioradialis
- ECRL (Extensor carpi Radialis Longus)

iv)

In the Cubital fossa (Ant+ to Lateral epicondyle; the Radial N. divides in 2 terminal branches)



Cherelgia Paresthetica → Compression of the superficial br. of Radial Nerve @ Wrist.



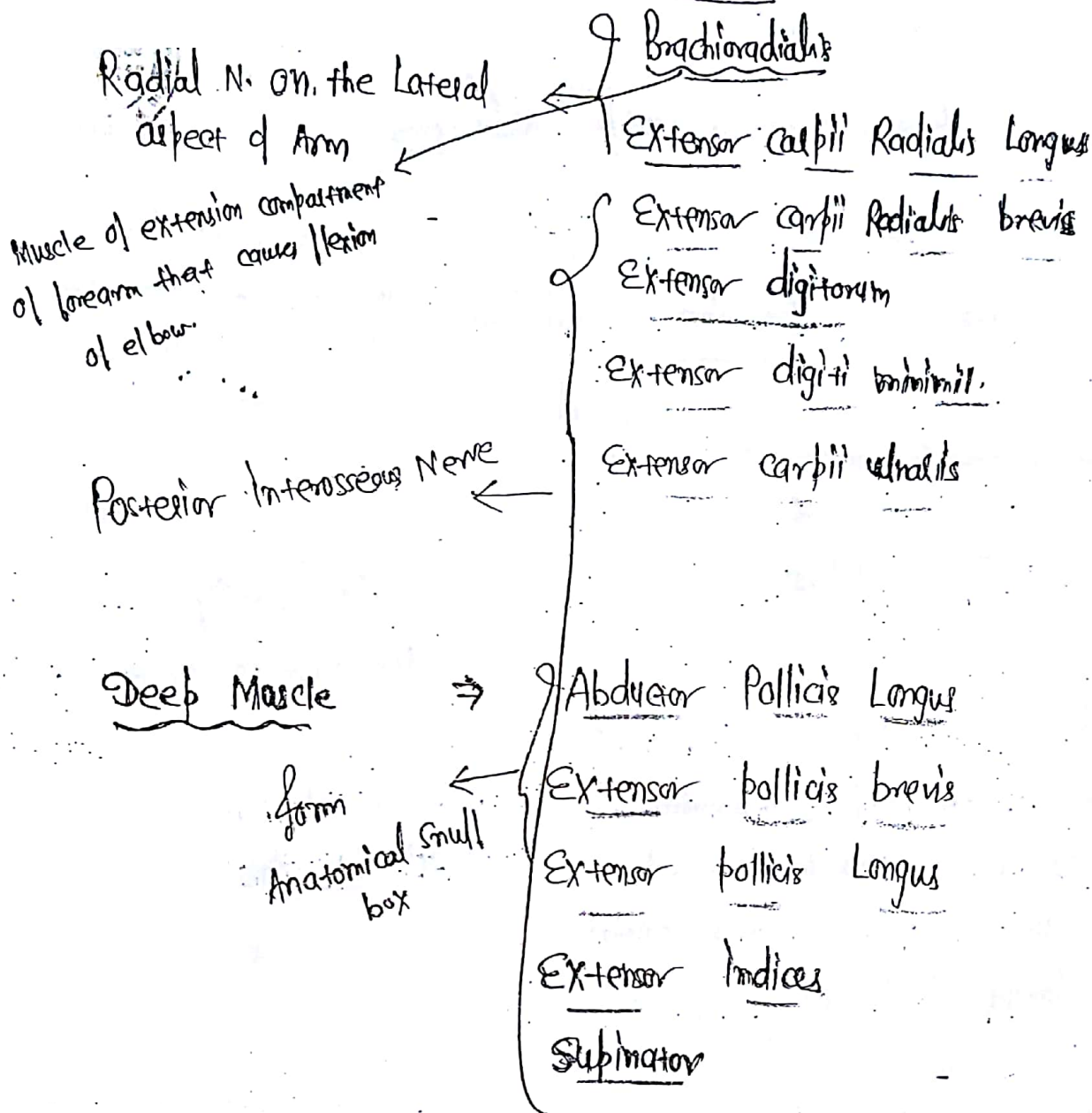
* Last Muscle Supplied by Radial N

↓
ECRL

BACK OF THE FOREARM

SUPERFICIAL MUSCLE ⇒

Inserted on ^{DNB 1/6} base of 5th Metacarpal bone.
Anconeus - Radial N. in spiral groove



Wrist drop ⇒ d/t Paralysis of ECRL

Finger drop ⇒ d/t Paralysis of Extensor digitorum

Extension @ wrist done by ⇒ ECRL supplied by Radial N

Extension of digit done by ⇒ Extensor digitorum supplied by Posterior interosseous Nerve

Lesion of Radial Nerve

High Lesion

- In axilla
- In spiral groove



Wrist drop & Finger drop

Low Lesion

Type-I

- b/w spiral groove & lateral aspect of Arm



Wrist drop & finger drop

Type-II

- In Cubital fossa



Got finger drop & Wrist drop

ANATOMICAL SNUFF BOX

Boundaries

→ Lateral / Anterior → Abductor Pollicis Longus
Extensor Pollicis Brevis

Medial / Posterior → Extensor pollicis Longus

Floor → Styloid process of Radius
Scaphoid
Trapezium

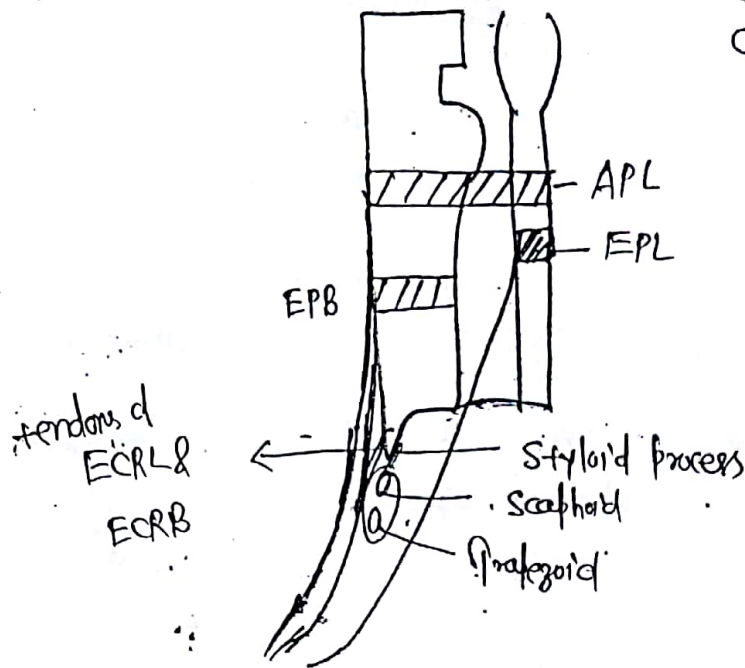
→ Floor is carpeted by tendons of ECRL & ECRB

Content → Radial A. (only one content)

Roof → Cephalic vein

Sup. branch of Radial n.

* Finger by which all the Nerves
can tested \Rightarrow Thumb



EXTENSOR RETINACULUM

Lateral to Medial compartment \Rightarrow

Ist compartment \Rightarrow Abductor pollicis Longus
Extensor pollicis brevis

IInd compartment \Rightarrow ECRL
ECRB

IIIrd compartment \Rightarrow Extensor pollicis Longus

IVth compartment \Rightarrow Extensor digitorum
Anterior Interosseus A
Extensor indicis
Posterior Interosseus N.

Vth compartment \Rightarrow Extensor digiti minimi

VIth compartment \Rightarrow Extensor carpi ulnaris

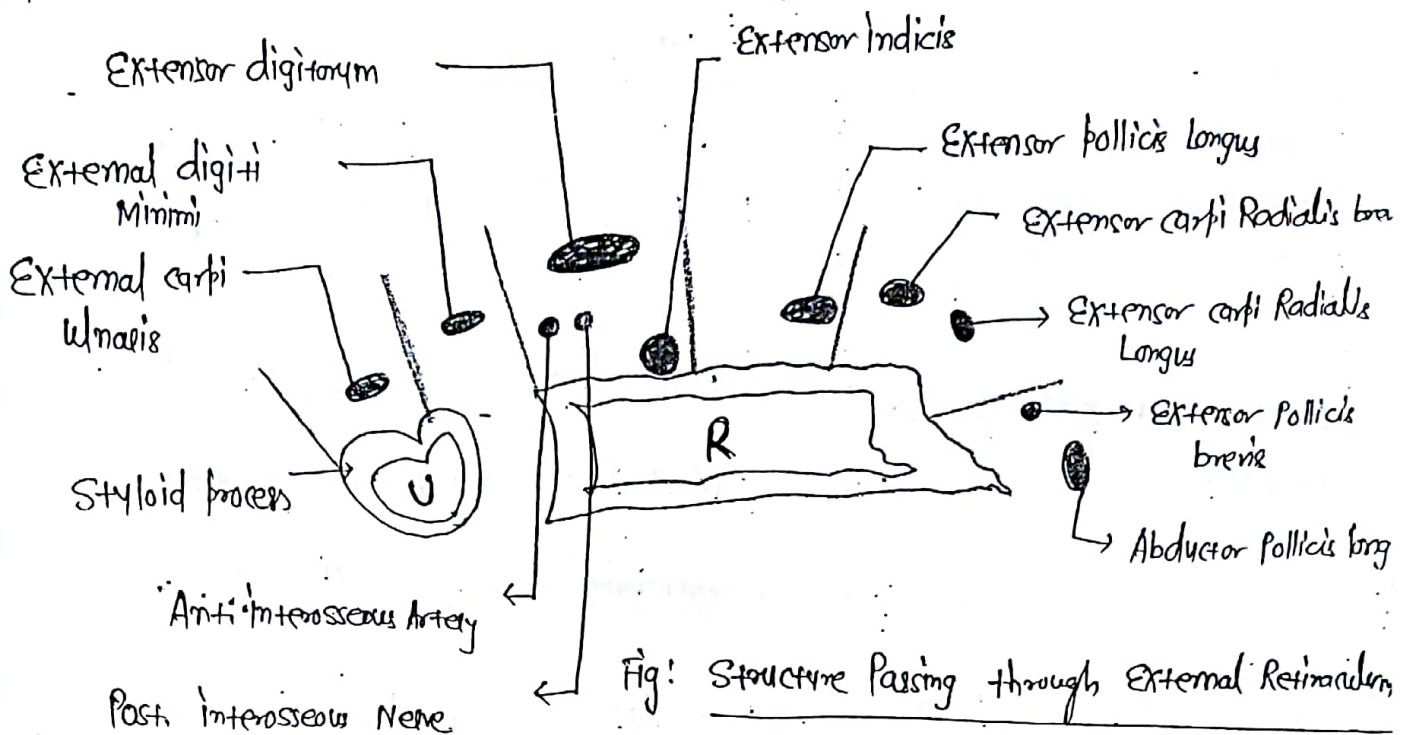
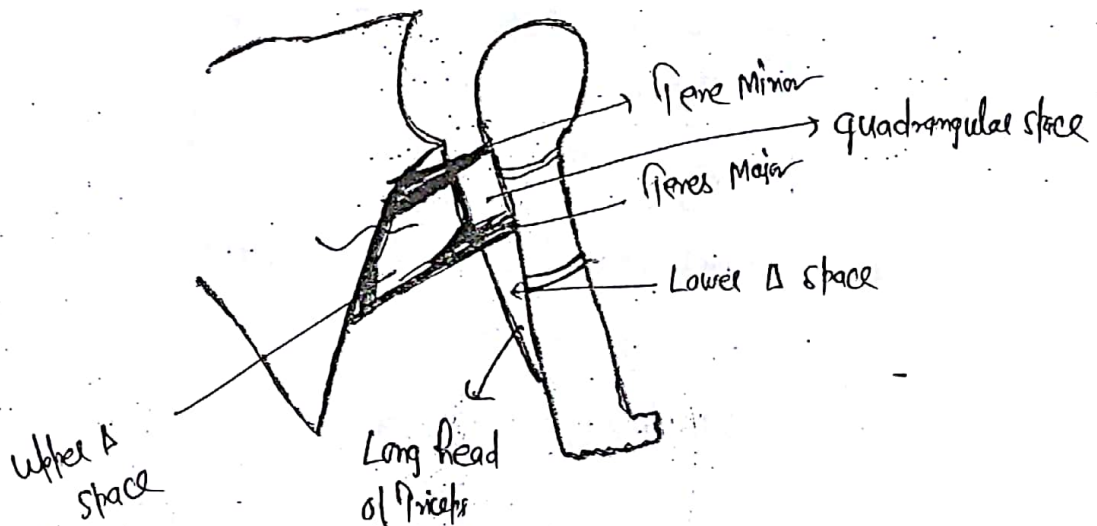


Fig: Structure Passing through External Retinaculum

De Quervain's tenosynovitis \Rightarrow Inflammation & Nodule formation in the synovial sheath of Abductor Pollicis Longus & extensor Pollicis brevis; Result in Pain over Radial sty

Spaces Around the Arm



Upper Δ space \Rightarrow Content \Rightarrow Circumflex humeral A

Lower Δ space \Rightarrow Content \Rightarrow Radial N.

Profunda brachii A

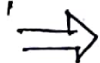
Quadrangular space \Rightarrow Content \Rightarrow

Axillary N.

Posterior circumflex humeral vessels

Region

- Upper Triangular Space of Arm



Boundaries

Superior: Teres Minor

Inferior: Teres Major

Lateral: Long heads of Triceps

- Lower Triangular Space of Arm



Superior: Teres Major

Medial: Long head of Triceps

Lateral: Shaft of Humerus

- Quadrangular Space of Arm



Superior: Teres Minor

Inferior: Teres Major

Medial: Long head of Triceps

Lateral: Surgical Neck of Humerus

* DERMATOME →

THUMB - C₆

3 fingers - C₇

Little finger - C₈

1st web space - C₆-C₇

Last web space - C₇-C₈

Chief Lymph Node draining the breast \Rightarrow Ant. Axillary (17)

Chief Artery supplying the breast \Rightarrow Lateral thoracic Artery.

Involvement of cutaneous lymphatics in Ca breast \Rightarrow Peau-de-orange appearance
leads to

Involvement of Lactiferous duct in Ca breast \Rightarrow Retraction of Nipple
leads to

Involvement of Cooper's Ligament in Ca breast leads to \Rightarrow Puckering/
drooping of skin of breast.

Triangle of Auscultation

Medial \Rightarrow Trapezus

Lateral \Rightarrow Medial border of Scapula

Base \Rightarrow Latissimus dorsi

Floor \Rightarrow 6th & 7th Rib & Intercostal space b/w them
& Rhomboides Major

* Wrist joint is formed b/w Lower end of Radius & 1st 3 carpal bones
(Scaphoid, Lunate & Triquetrum)
- Separated by Articular disc

JOINTS OF UPPER LIMB

Sterno clavicular joint \Rightarrow Saddle type of synovial joint.

Acromio clavicular joint \Rightarrow Plain synovial joint
 \hookrightarrow only gliding movement

Shoulder joint \Rightarrow Ball & Socket joint

Elbow joint \Rightarrow Hinge joint

Superior & inferior Radio-ulnar joint \Rightarrow Pivot joint (synovial)
(Trochoid)

Middle Radio-ulnar joint \Rightarrow Syndesmosis type of fibrous joint

Wrist joint \Rightarrow Ellipsoidal type of joint

1st carpometacarpal joint \Rightarrow Saddle type of synovial joint
(sellar)

Intercarpal joint \Rightarrow Plain synovial joint

Metacarpophalangeal joint \Rightarrow Condylar type of synovial joint (Ellipsoidal
More than
condyles).

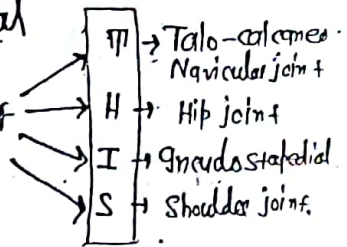
Interphalangeal joint \Rightarrow Hinge joint

* Unipennate Muscle \Rightarrow Arises from 1 tendon (Eg \Rightarrow 1st & 2nd Lumbricals)
or from 1 bone (Eg \Rightarrow Palmar interossei)

* Bipennate Muscle \Rightarrow Arises from 2 tendon (Eg \Rightarrow 3rd & 4th Lumbricals)
or from 2 bones (Eg \Rightarrow Dorsal interossei)

* Most frequently dislocated joint \Rightarrow Glenohumeral (most mobile joint)

- * Sub-talar joint (Talo calcaneum) → Plain synovial
- * Talo calcaneonavicular joint → Ball & socket
- * Calcaneocuboid joint → Saddle
- * Smaller joint of Forefoot → Plain synovial
- * Meta-tarsophalangeal joint → Condylar joint
- * Interphalangeal joint → Hinge joint



ARCHES OF FOOT

Medial Longitudinal Arch

Bones → Calcaneum; Talus;
Navicular; 3 cuneiform;
3 Metatarsal bones

Interssegmental → Spring Ligament / Plantar calcaneo-Navicular Ligament



Supports the head of Talus

Sling → Tibialis Anterior & Tibialis Posterior

Lateral Longitudinal Arch

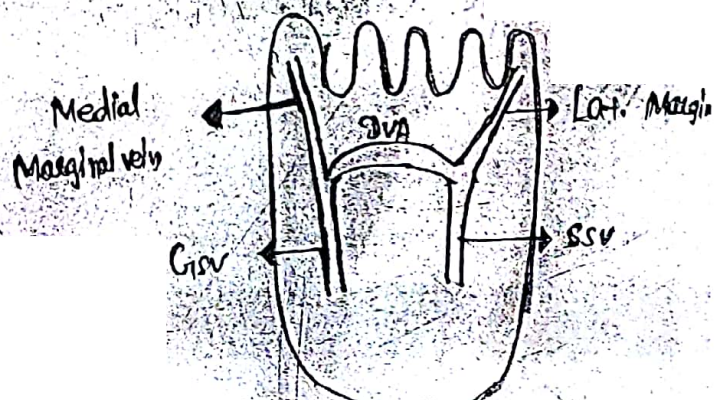
Calcaneum; cuboid;
4th & 5th Metatarsal

Short & long plantar Ligaments

Peroneus Longus & Peroneus Brevis

VENOUS DRAINAGE OF LOWER LIMB

- ① Dorsal venous Arch
- ② Medial Marginal vein
- ③ Lateral Marginal vein
- ④ GSV (Great saphenous vein)
- ⑤ SSV (Short saphenous vein)



Great saphenous vein (GSV)

- Goes in front of Medial Malleolus
↳ 1cm Anterior to Medial Malleolus (NEET'16)

- Accompanies the saphenous N

- Drains into femoral vein

Saphenous opening lies 4cm (1.5 inch) below & lateral to pubic tubercle where it opens into femoral vein.

Perforating veins (They connect the superficial veins to the deep veins)

Location

Mid thigh
(Godts)
Huntarian

Adductor
canal

Knee
Perforator
(Boyd's)

Just below
Knee

Leg -
Lateral Ankle

Junction of
Middle & Lower third

Leg -
Medial Ankle
(Cockett)

Upper Medial -
Junction of Middle &
Lower third of Leg

Lower Medial -
below & behind Medial
Malleolus

Middle - b/w two

Short saphenous vein (SSV)

- Goes behind the Lateral Malleolus

- Accompanies the sural N

- Drains into Popliteal / Post-tibial vein

Connects

Great saphenous vein
with the femoral vein

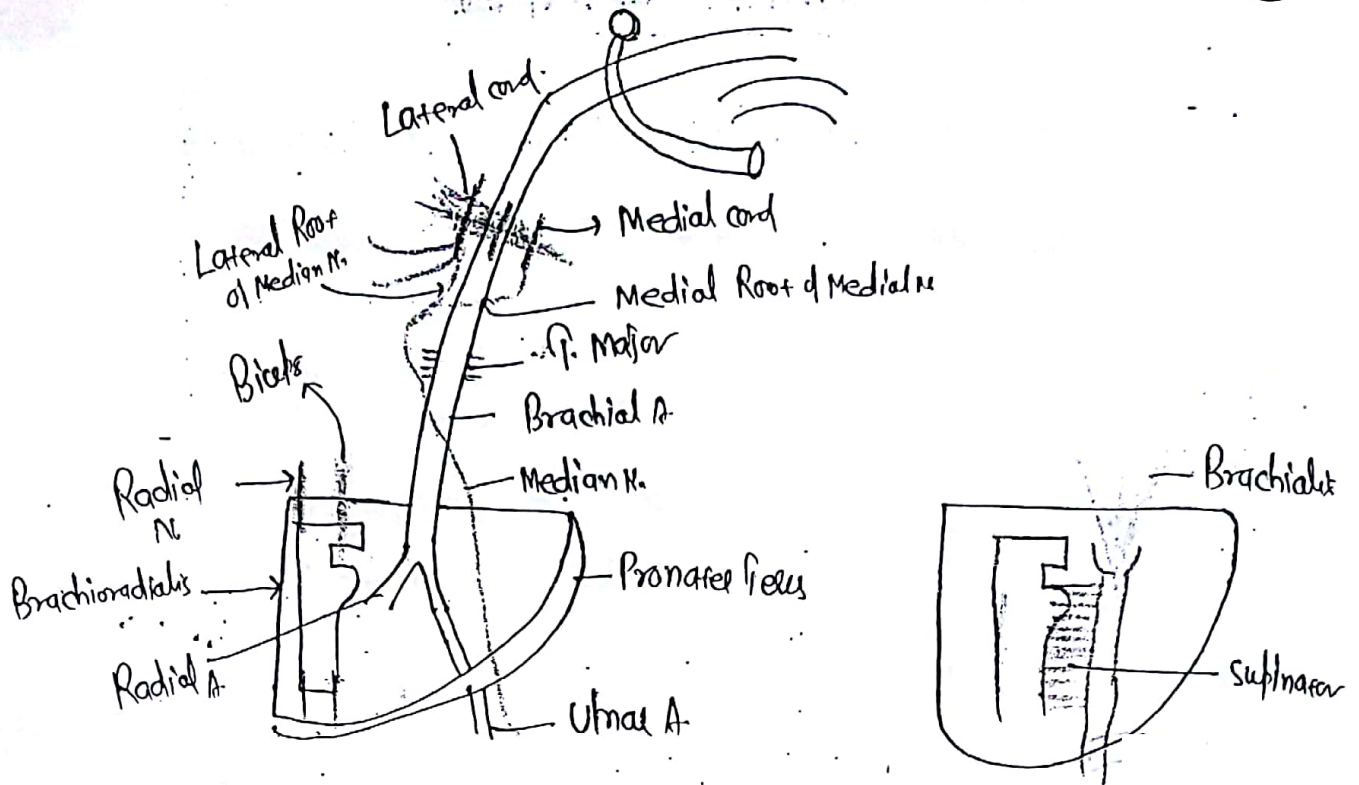
Great saphenous with the
Posterior tibial V.

Short saphenous with the
Peroneal vein

Posterior Arch vein
to the Posterior tibial
vein

CUBITAL FOSSA

19



- AT-15
- Structure over bicipital Aponeurosis in cubital fossa \Rightarrow Veins. Floor
 - Bicipital Aponeurosis lies over Brachial Artery & Median Nerve in cubital fossa.
 - * Tennis Elbow \Rightarrow Type of Repetitive strain injury Resulting from tendon overuse & failed healing of tendon.
 - "Extensor carpi Radialis brevis" Muscles play a key Role.
 - Klaus "Lateral epicondylitis" (NEET 2016)

Boundaries of cubital Fossa \Rightarrow Superior \rightarrow Inter-epicondylar line of Humeri

Medial \rightarrow Pronator teres ;

Lateral \rightarrow Brachioradialis ;

Floor \rightarrow Brachioradialis & supinator

Roof \rightarrow Skin; superficial fascia; Median cubital vein; Bicipital Aponeurosis.

Content of cubital fossa (Medial to Lateral) \Rightarrow • Median Nerve (Medial Root) ;

• Brachial Artery (Bifurcation of brachial A \rightarrow initial part of Radial

• Tendons of biceps brachii & ulnar artery

• Radial Nerve

• Some Lymph Nodes

GENERAL EMBRYOLOGY

- Fertilisation occurs in \Rightarrow Ampulla of Fallopian tube
- Zygote divides to form \Rightarrow 16 celled Morula



as it enters in Uterine cavity, fluid from the uterus enters the Morula & divides it into

Outer cell mass/
Trophoblast

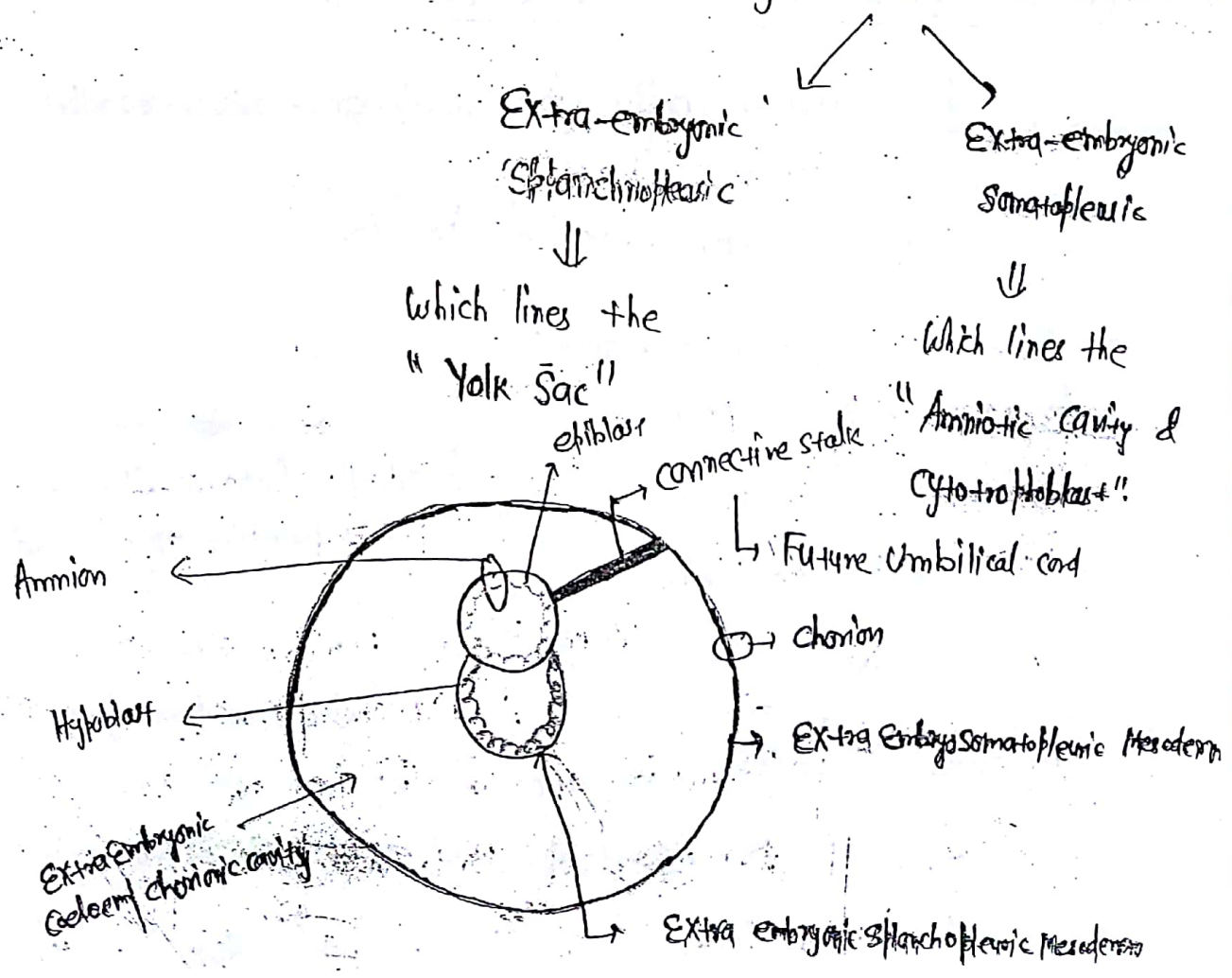
Inner cell mass/
Embryoblast

- cavity is k/as "Blastocoel"
- This structure is k/as "Blastula"

- The outer cell mass / differentiate into
Trophoblast
 - Syncytiotrophoblast
 \downarrow
cell walls are abt. ;
& the Nuclei are scattered
 - Cytotrophoblast
 \downarrow
cell walls are distinct ;
there is one Nucleus in each cell

- The Inner cell mass / differentiate into
Embryoblast
 - Ectoblast
 \downarrow
all the somatic cells
 - Myoblast
 \downarrow
cardiac cells

- Epiblast grows around the cytotrophoblast to enclose + Amniotic cavity.
- Hypoblast similarly encloses the Yolk sac.
- The germ disc is \Rightarrow Bilaminar
- The Hypoblast / Yolk Sac forms "Extra-embryonic Mesoderm"
 \downarrow
 which lies b/w Amniotic cavity, Yolk Sac & Cytotrophoblast.
- Small cavities appear here; which join to form extra-embryonic coelom / chorionic cavity; this cavity divides the Mesoderm in



(I) Formation of Pro-chordal plate / Bucco-pharyngeal Membrane:

- The Hypoblast @ one end become columnar.



they form an elevation in the Amniotic cavity



K/lay "Prochordal plate"



forms future Mouth

→ determines cephalic end & caudal axis of embryo.

(II) Formation of Primitive Streak ⇒

- The epiblastic cells @ caudal end grows rapidly



they form an elevation in the Amniotic cavity



* cell Responsible for formation of 3 germ layers in an embryo is ⇒ Epiblast;

K/lay "Primitive streak"



* 1st germ layer to be formed in embryo is

Rounded Anterior structure is K/lay "Primitive knot / node"

↓
Endoderm > Mesoderm > Ectoderm

↓
Depression in Primitive Knot is K/lay "Blatopore / Primitive pit"

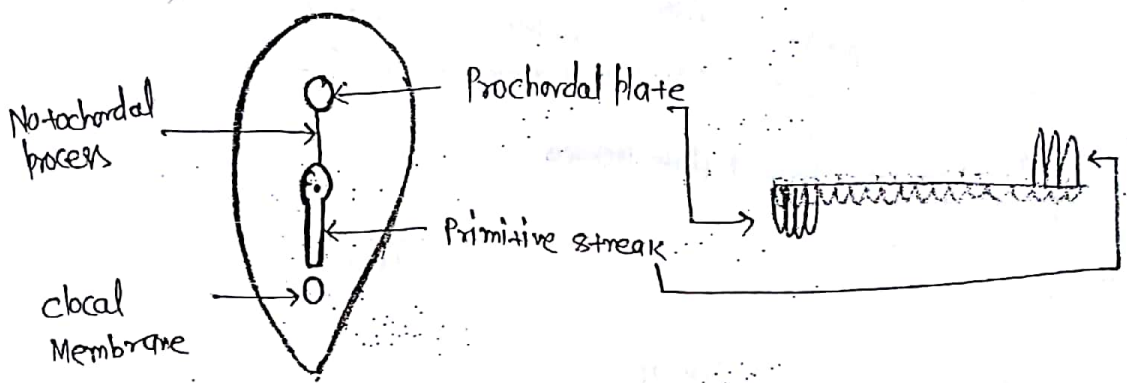
Functions ⇒

- (1) Formation of all the germ layers;
- (2) formation of Notochord process

Fate ⇒ It disappears, but if persists form "Gastrulation" ~~Stomach~~

III Formation of Notochord \Rightarrow

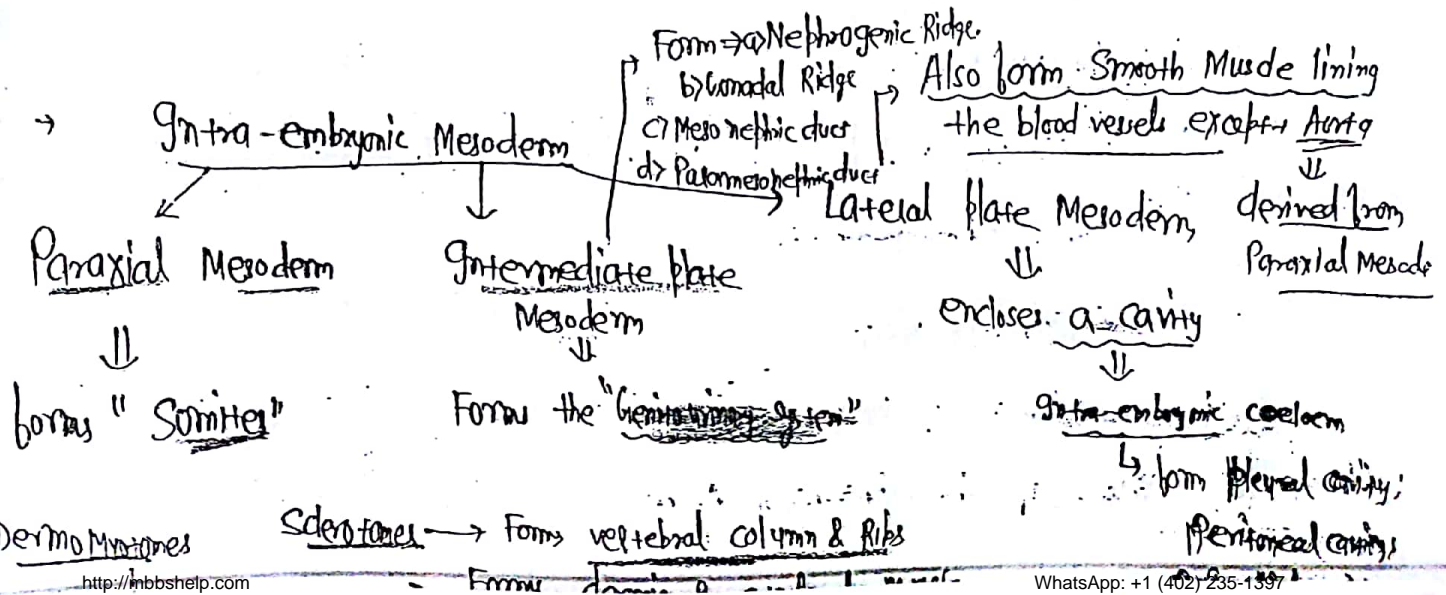
- derived from Notochordal process (derived from primitive streak)
- The blastopore inside this process to form a Notochordal canal.
- Lies in Mesoderm.
- extends from primitive knot to prochordal plate
- It disappears "except" \Rightarrow Nucleus pulposus of intervertebral disc, Apical Ligament of Dens



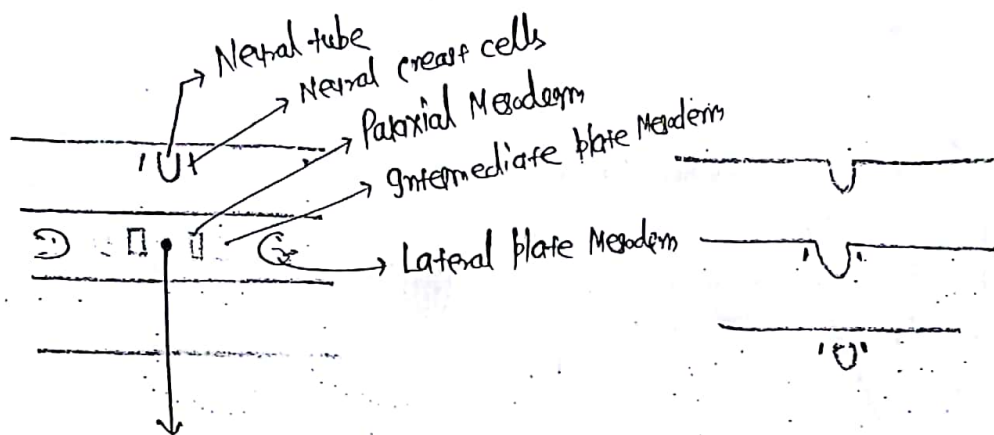
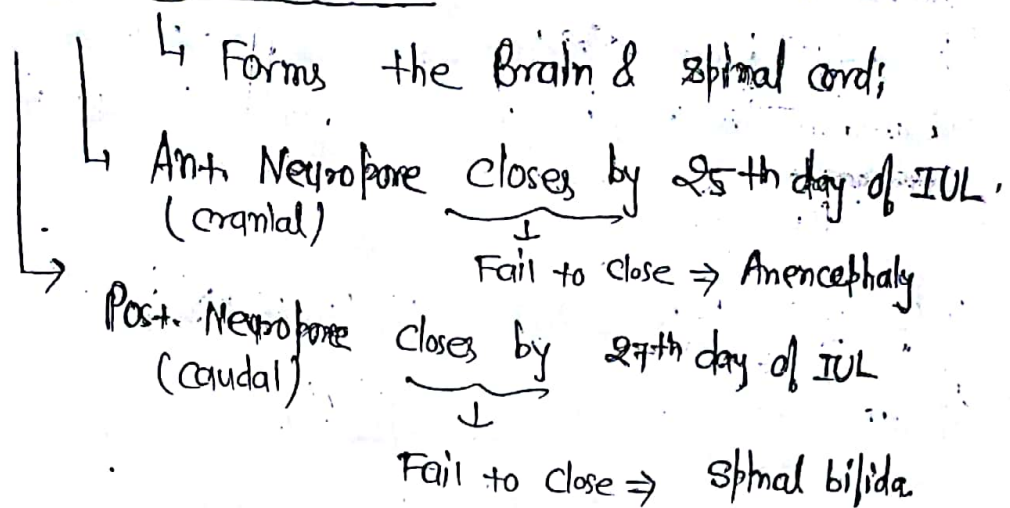
IV Intra-embryonic Mesoderm \Rightarrow it migrates b/w Ectoderm & Endoderm at all the sites except \rightarrow Prochordal Plate

\rightarrow Cloacal Membrane

At this two ends the ectoderm & endoderm are fixed



Formation of Neural tube \Rightarrow Derive from ectoderm.

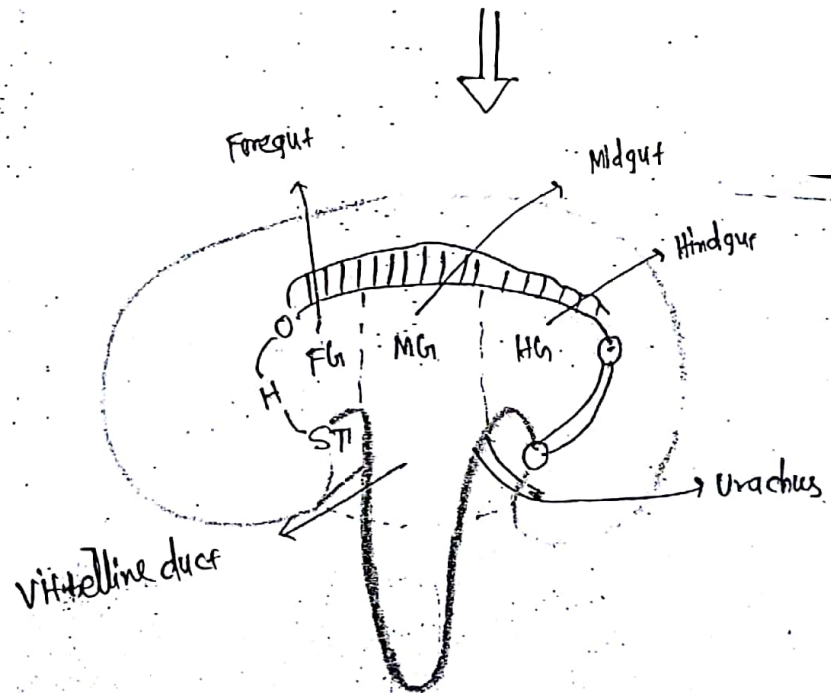
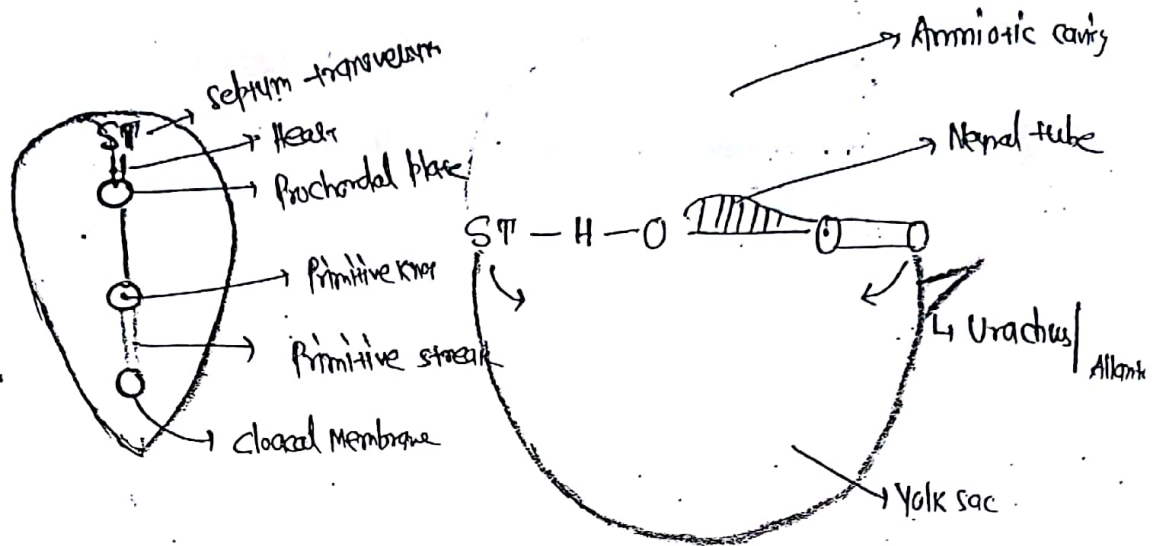


closure of Neural tube begins in the cervical Region; then extends cranially & caudally.

* Derivative of Neural crest cells \Rightarrow

- ① Adrenal Medulla OR NEPHRONE
- ② Leptomeninges (Pia mater + Arachnoid)
- ③ odontoblast (teeth forming cells)
- ④ Melanocytes
- ⑤ Schwann cells (form Myelins in Peripheral Nervous system)
- ⑥ Dorsal Root ganglion
- ⑦ Autonomic ganglion
- ⑧ Skeleton of Face
- ⑨ Nerves of the Pharyngeal Arches

- (10) Endocardial cushion of the heart;
 (11) Aortic-pulmonary septum;
 (12) Para-follicular 'c' cells of Thyroid.



- 1^o villus \Rightarrow Syncytio-trophoblast & cyto-trophoblast
2^o villus \Rightarrow Syncytio-trophoblast + cyto-trophoblast + Extra-Embryo Mesoderm
3^o villus \Rightarrow Syncytio-trophoblast + cyto-trophoblast + Extra-Embryonic M + B vessels

*

Feto-placental barrier \Rightarrow

- ① Endothelial cells of maternal B. vessel,
- ② Syncytio-trophoblast;
- ③ Cyto-trophoblast;
- ④ Extra-embryonic Somatopleuric Mesoderm;
- ⑤ Endothelium of fetal blood vessel.



INFERIOR EXTREMITY

- ↳ Klu "Subinguinal space"
- Pelvic femoral space \Rightarrow Lies below the Inguinal Ligament;
 - Similar to apex of axilla,

Meralgia Paresthetica \Rightarrow Compression of Lateral femoral cutaneous
N. of thigh (Branch of Lumbar plexus)
, against + the Inguinal Ligament.

- Femoral triangle \Rightarrow Boundaries \Rightarrow

Laterally \Rightarrow Medial border of sartorius

Medially \Rightarrow Medial border of Adductor Longus

Base \Rightarrow Inguinal Ligament

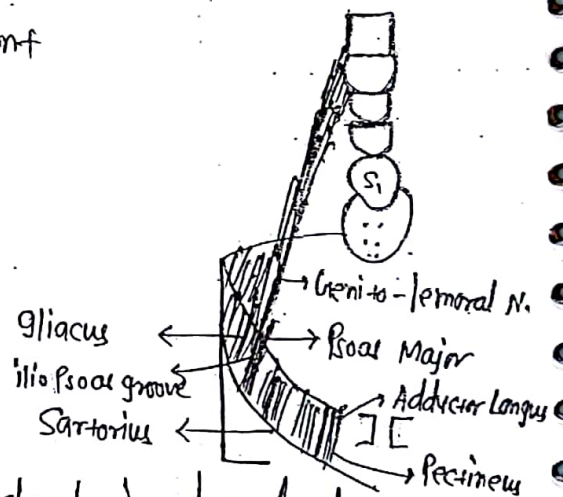
Floor \Rightarrow Gluteus;
(Lateral to Medial) Psoas Major

Pectineus;

Adductor Longus

Contents \Rightarrow

Femoral vessels enclosed in femoral sheath;
Femoral Nerve.

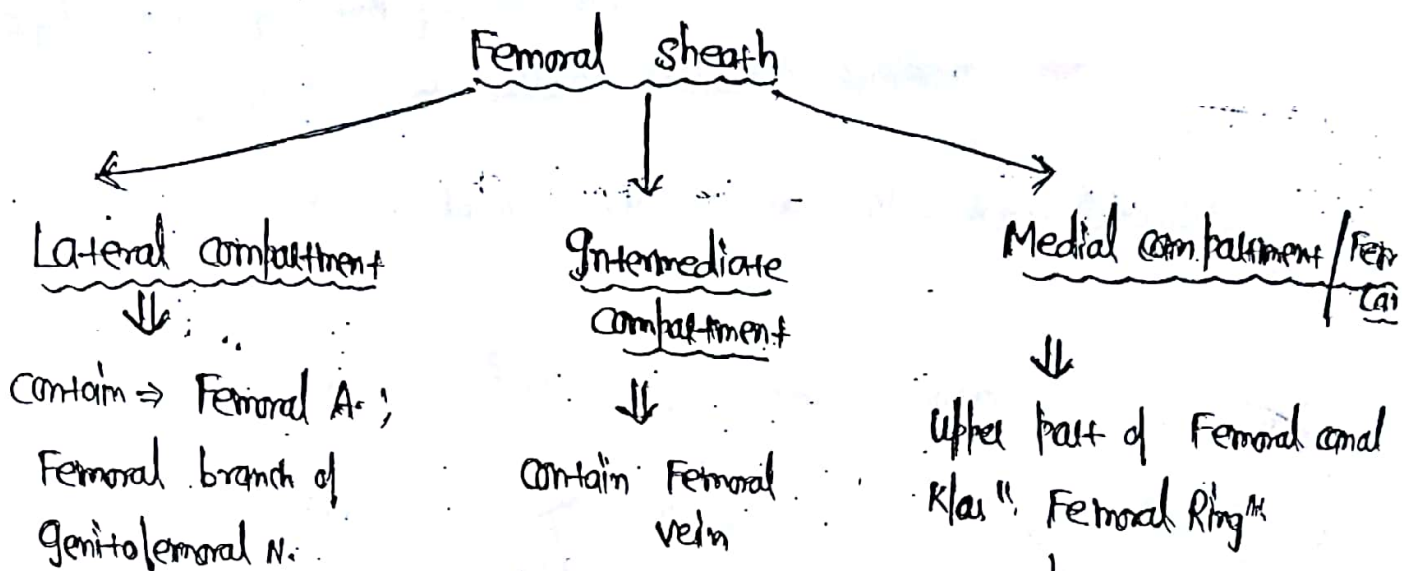


- * Femoral Hernia \Rightarrow Below & Lateral to Pubic tubercle
- Inguinal Hernia \Rightarrow Above & Medial to Pubic tubercle

Femoral sheath ⇒ Funnel shaped fascial sheath enclosing upper 3-7.5 cm of Femoral vessels.

Anteriorly ⇒ Fascia transversalis

Posteriorly ⇒ Fascia iliaca



→ Boundaries of Femoral Ring ⇒

Anterior ⇒ Inguinal Ligament / Poupart's Ligament

Medially ⇒ Lacunar Ligament / Gimberna's Ligament

Posteriorly ⇒ Pectinate Ligament / Cooper's Ligament

Laterally ⇒ Septum separating it from Femoral vein

* Femoral Ring is closed by "Lymph Node of Cloquet / Rosenmüller's"

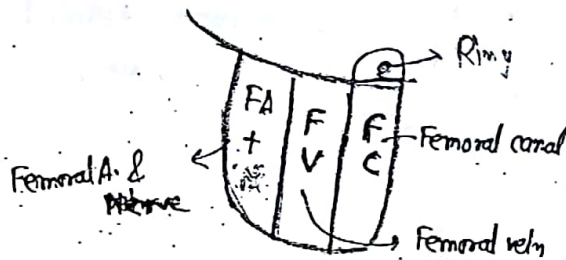
II
drain by glans penis or glans clitoris.

* Femoral Ring is wider in females d/f wider pelvis & smaller size of blood vessels.



Occasionally Abnormal obturator artery (Branch of Inferior epigastric A.) lies on Locunal Ligament, leading to hemorrhage

CFT/16
* Femoral Nerve lies outside the Femoral sheath



Anterior superior iliac spine
(ASIS)

Muscle - Sartorius

Ligament - Inguinal

Ant. Inferior iliac spine
(AIIS)

Straight head of Rectus femoris

Ilio-femoral Ligament

Anterior compartment of thigh

SARTORIUS ⇒ Origin ⇒ Ant. Superior iliac spine

Longest Muscle of the body. Insertion ⇒ Medial aspect of shaft of tibia along with gracilis & semitendinosus

⇓
Guy Ropes (Pes Anserinus)

Action ⇒ Abduction; Lateral Rotation & Flexion @ Hip joint
Flexion & Medial Rotation @ Knee joint

— Also known as "Tailor's Muscle" or "Honeymoon Muscle"

Quadriceps femoris ⇒ Rectus Femoris + Vastus medialis + vastus intermedius + Vastus Lateralis

Rectus Femoris ⇒

Straight head



arises from
Ant. Inferior
Iliac spine

Reflected head



arises above
the Acetabulum

Action ⇒ extension @ Knee joint & flexion @ Hip joint.

Vastus Medialis

Vastus Intermedialis

Vastus Lateralis



Vastus Medialis stabilizes Patella & prevent its Lateral dislocation.

Insertion of Quadriceps femoris \Rightarrow Base of the patella



Continues as Ligamentum patellae



Action \Rightarrow

Extension @ the knee joint; Rectus femoris also causes flexion @ the hip joint.

Locking of the knee joint (Medial Rotation of Femur during the final stages of extension; When the foot is on the ground)



When foot is off the ground \rightarrow Tibia Rotates laterally

Femoral Nerve

- Largest branch of Lumbar plexus;
- formed by the dorsal division of ventral Rami of L₂, L₄.
- Lies in the ilio-Psoas groove.
- Lies outside the femoral sheath,
- It has a trunk; Anterior & Posterior division.
- Branches from Trunk ⇒ N. to Glia; N. to Pectineus; (Lateral half)

CET July 16
N. to Pectineus passes Medialward behind the femoral Artery.

- Branches from Ant. division ⇒

1 Muscular



Sartorius

2 Cutaneous



Medial & Ant. intermediate femoral cut Nerve of thigh

- Branches from Post. division ⇒

4 Muscular



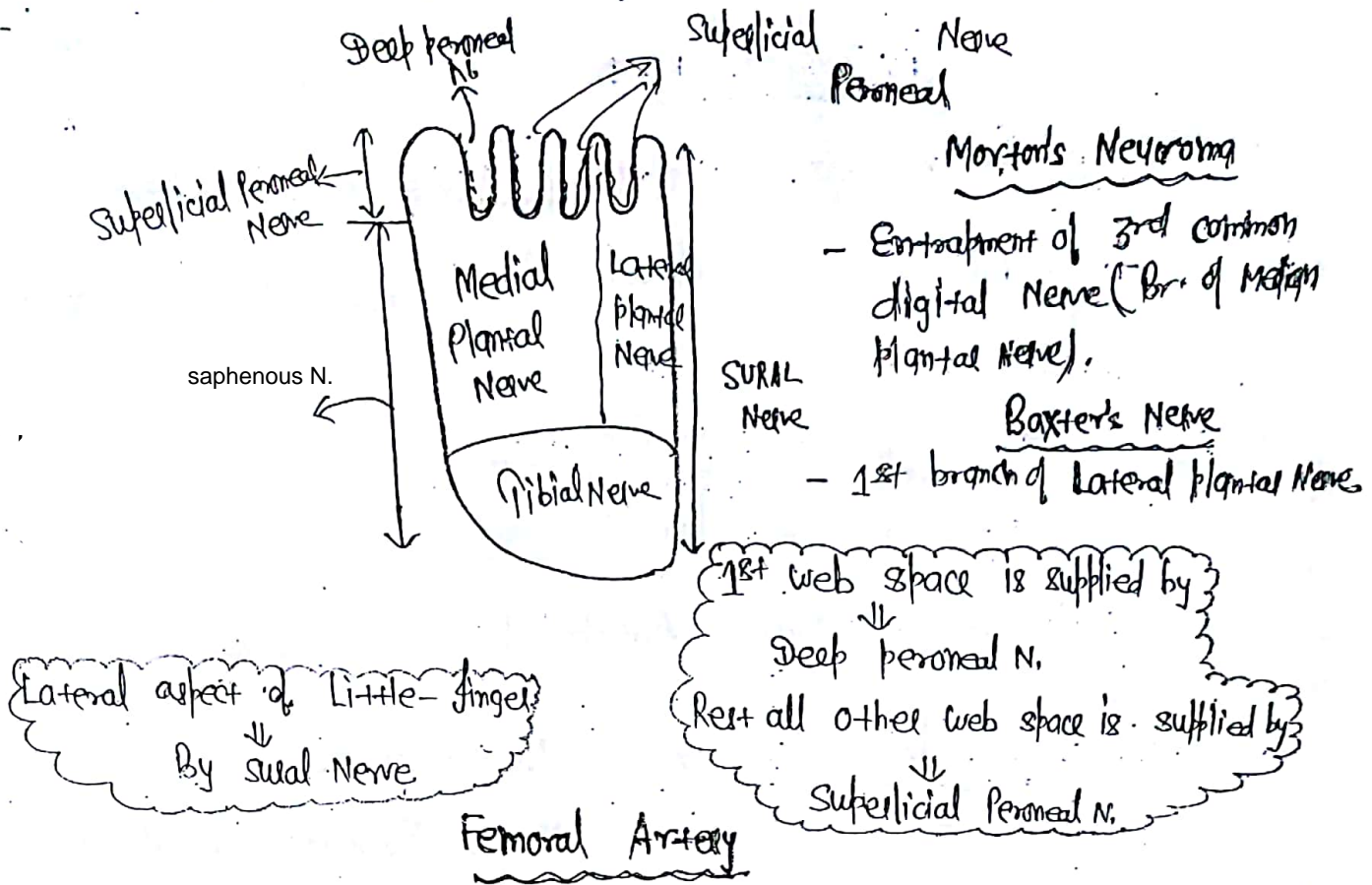
Quadriceps femoris

1 Cutaneous

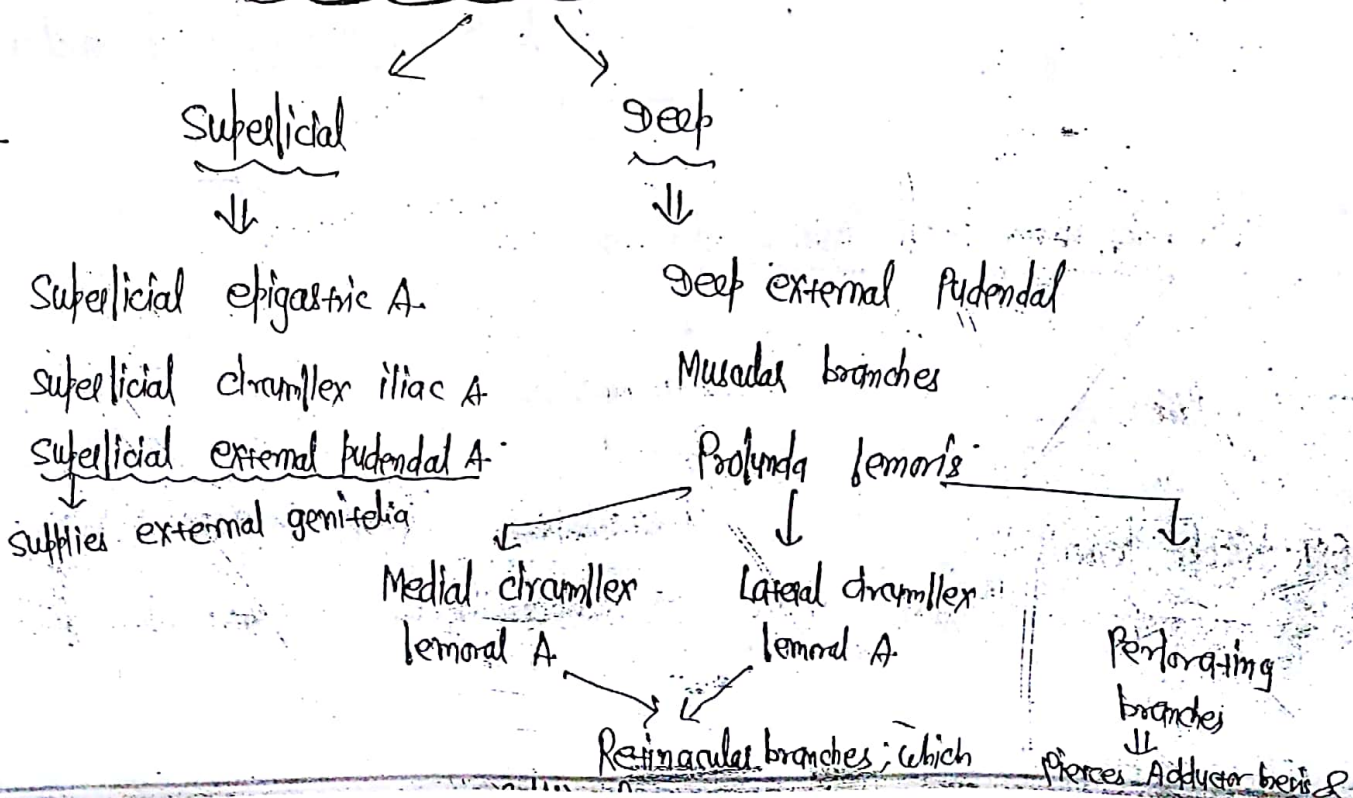


Saphenous Nerve (Longest Cutaneous N.)

↳ Supplies the skin on Medial aspect of Leg & foot upto great toe



- Continuation of external iliac; below Inguinal Ligament.
- Continues as Popliteal artery; after piercing Adductor Magnus @ Hiatus Magnus.
- Branches in the femoral A ⇒



Total No of Perforators \Rightarrow 4

↳ 2nd Perforating branch gives Nutrient A. to femur

- Branches in Adductor Canal \Rightarrow

Descending Genicular Artery

↳ Last branch given by the femoral before it pierces the adductor Magnus

Extra edges

* Coronary Ligament \Rightarrow Attaches the Medial & Lateral Meniscus to the Medial & Lateral condyle of tibia.

* Menisco-femoral Ligament \Rightarrow attaches the posterior part of Lateral Meniscus to the Femur.

① Anterior Menisco-Femoral Ligament / Ligament of Humphrey \Rightarrow
Goes Anterior to PCL.

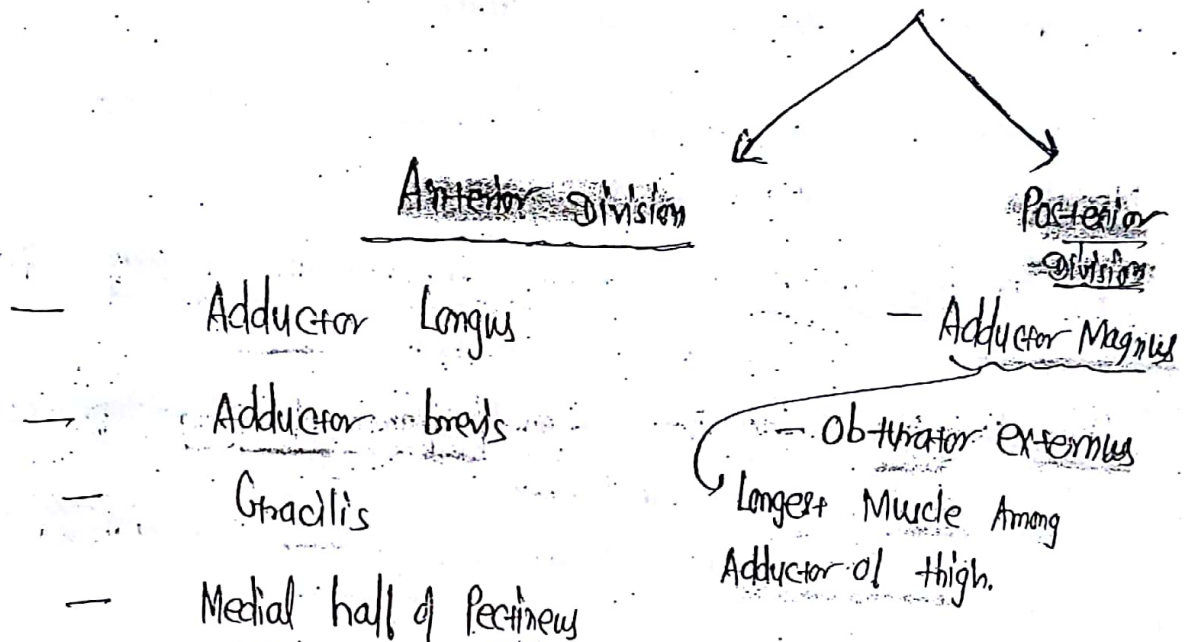
② Posterior Menisco-Femoral Ligament / Ligament of Wrisberg \Rightarrow
Lies behind the PCL

N. of Wrisberg \Rightarrow Nervus Intermedius (Sensory br. of Facial Nerve)

Medial Compartment of Thigh (Adductor of Thigh)

Obturator Nerve \Rightarrow Branch of Lumbal Plexus

- Formed by ~~ventral~~ division of ventral Rami of L₂, L₃, L₄.
- Related to Ala of the Sacrum,
- Forms the lateral boundary of "Ovarian fossa".
- Emerges out through obturator foramen & divides into



Action \Rightarrow Adduction & Medial Rotation @ Hip joint.

Gracilis also causes Flexion & Medial Rotation @ Knee joint.
(Anti-Rapist Muscle)
(Custodian of virginity)

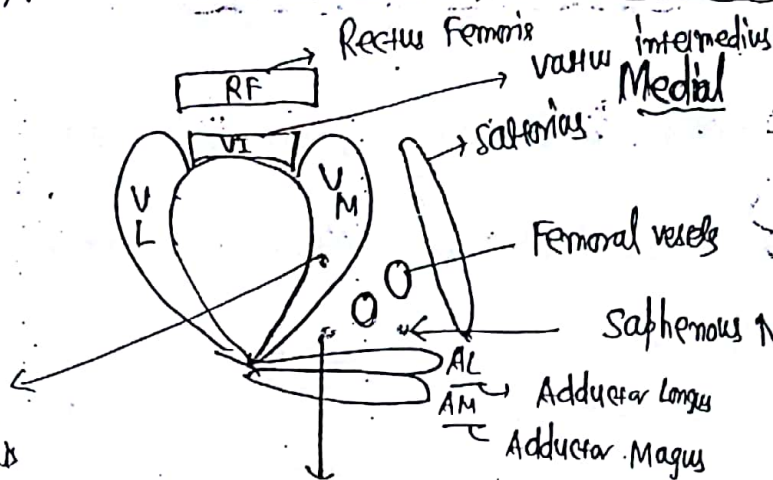
Obturator externus causes Lateral Rotation of the hip joint.

* Obturator N. supplies both Hip & Knee joints. In case of disease of hip joint may be referred to knee joint.

Lies beneath the Sartorius Muscle, (UP07):

Adductor Canal / Subartorial Canal / Hunter's canal 53

Lateral



Starts at the apex of the femoral Δ & extends distally as far as the distal attachment of the tendon of adductor Magnus

N. to vastus Medialis

Post. division of obturator Nerve

DNB 16 * Saphenous Nerve is Anterior to femoral A in Adductor canal.

Boundaries \Rightarrow Anterior \Rightarrow Sartorius;

Lateral \Rightarrow vastus Medialis;

Posterior \Rightarrow Adductor Longus & Adductor Magnus.

CONTENT OF ADDUCTOR CANAL \Rightarrow

Femoral Artery;

Femoral vein;

N. to vastus Medialis;

Saphenous Nerve (largest cutaneous br. of femoral);

Descending genicular Artery

Medial br. of femoral Artery

Saph. lymph vessels

* Bursa which communicates \bar{c} cavity of knee joint \Rightarrow Suprapatellar bursa

* Inflammation of Pre-patellar bursa \Rightarrow Housemaid's knee

* Inflammation of Infrapatellar bursa \Rightarrow Clergyman knee

* Inflammation of bursa over ischial tuberosity \Rightarrow Weaver's bottom / Tailor's / Students

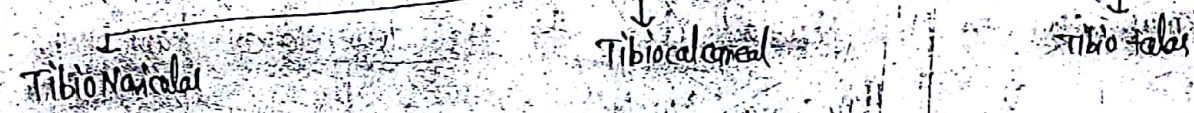
* Anserine bursa \Rightarrow separate insertion of sartorius, gracialis & semitendinosus from tibia

Structure passing below Sustentaculum Tali

- Flexor Hallucis Longus

* Most stable position of Ankle joint is \Rightarrow Dorsiflexion

* Deloid ligament



POSTERIOR COMPARTMENT OF THIGH

Hamstring Muscle \Rightarrow

- Semi-tendinosus
- Semimembranosus (Inserted on the medial condyle of tibia; continues as the oblique popliteal Ligament, which lies in the floor of popliteal fossa)

• Adductor Magnus
(Ischial Head)

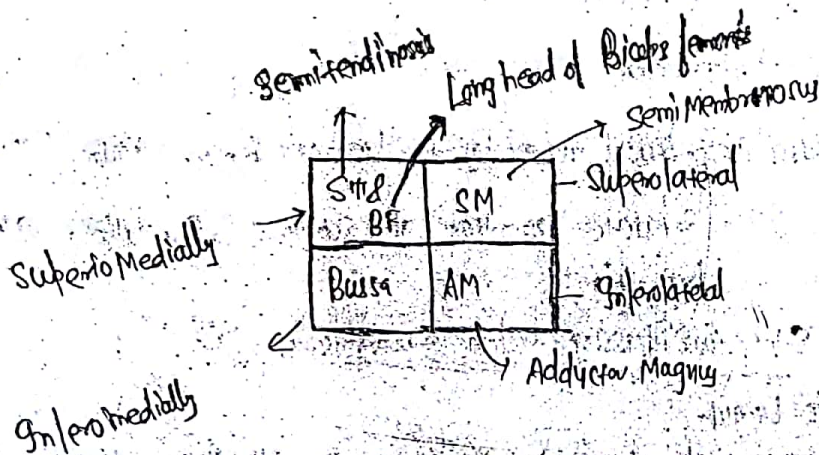
• Biceps femoris

Long head

Arises from the ischial tuberosity

Short head

Arises from Linea Aspera of Femur.



* Adductor Magnus not fulfill the Hamstring criteria b/c of its insertion in femur (Not in Tibia/Fibula) but all its degenerated part it is considered as "Hamstring Muscle".

Popliteal collateral Ligament

Criteria for Hamstring \Rightarrow origin \Rightarrow Ischial tuberosity

Inversion \Rightarrow Tibia & Fibula

N. supply \Rightarrow Tibial part of Sciatic Nerve

Action \Rightarrow Extension @ Hip Joint & flexion @ the Knee Joint.

Degenerative Parts

* Tibial Collateral Ligament \Rightarrow

\hookrightarrow degenerated part of Adductor Magnus

* Fibular Collateral Ligament

\hookrightarrow degenerated part of Peroneus Longus

* oblique popliteal Ligament

\hookrightarrow degenerated part of Semimembranosus
 \hookrightarrow pierced by Middle genicular N. & vessels and the posterior division of obturator N.

* Sacro-tuberous Ligament \Rightarrow

\hookrightarrow degenerated part of Long head of Biceps femoris
 \hookrightarrow gives origin to Gluteus Maximus.

* Sacrospinous Ligament \Rightarrow

\hookrightarrow degenerated part of Coccygeus

* Articular disc of TM joint \Rightarrow degenerated part of Lateral Pterygoid

* Articularis geny \Rightarrow detached part of Vastus Intermedius.

\hookrightarrow Holds the apex of Supra-patellar bursa.

* The short head of biceps is not hamstring b/c

(a) Arises from Linea Aspera of femur.

(b) Supplied by Common Peroneal part of Sciatic N.

- Biceps Femoris is inserted on head of fibula.

Glio-tibial tract

- Formed by splitting of Fascia lata;

Muscle inserted \Rightarrow Gluteus Maximus

Tensor fascia lata.

- This tract is attached to anterior aspect of lateral condyle of tibia

- Action \Rightarrow Abduction & flexion @ hip joint.

Extension @ knee joint.

Gluteus Maximus

Origin \Rightarrow a) Gluteal surface of ilium behind the posterior gluteal line;

b) Dorsal aspect of iliac crest

c) Sacrum & coccyx

d) sacro-tuberous Ligament

* Site of I.M. injection in buttocks

\Rightarrow upper outer quadrant (Supero-lateral) site of Gluteal Region

Insertion \Rightarrow a) Glio-tibial tract

b) Gluteal tuberosity of femur.

N. Supply \Rightarrow Inferior Gluteal Nerve

Action \Rightarrow Extension
Lateral Rotation
Abduction } @ Hip Joint

Gluteus Medius & Minimus

Action \Rightarrow Abduction & Medial Rotation @ Hip Joint
 \downarrow \downarrow
 Mainly by G. Medius Mainly by G. Minimus

- They support the pelvis when one foot is off the ground

- The superior gluteal Nerve supply \Rightarrow Gluteus Medius

Gluteus Minimus

Insertion of Gluteus Medius \Rightarrow Lateral surface of greater trochanter of Femur, Tensor fascia lata

Insertion of Gluteus Minimus \Rightarrow Anterior surface of greater trochanter of Femur

* Key Muscle of gluteal Region \Rightarrow Piriformis

PELVI-FEMORAL MUSCLE

- ① Piriformis
 - ② Superior gemellus
 - ③ Obturator internus
 - ④ Inferior gemellus
 - ⑤ Quadratus femoris
- } Lateral Rotators of Hip. ^{QQ}
- } N. to Obturator Internus
- } N. to Quadratus femoris

* Structure Passing Above the Piriformis \Rightarrow ① Superior gluteal Nerve
 ② Superior gluteal vessels

Sclatic Bed - It is formed by \Rightarrow

- ① Superior gemellus
- ② Obturator Internus
- ③ Inferior gemellus
- ④ Quadratus femoris
- ⑤ Adductor Magnus

Popliteal Fossa

Boundaries \Rightarrow Superolateral \Rightarrow Biceps Femoris

Superomedial \Rightarrow Semitendinosus & Semimembranosus
assisted by Sartorius & gracilis

Inferolateral \Rightarrow Lateral head of Gastrocnemius

Inferomedial \Rightarrow Medial head of Gastrocnemius

Floor \Rightarrow Popliteal surface of Femur,
capsule of the knee joint

Oblique popliteal Ligament

Popliteus Muscle

Fascia covering the Popliteus Muscle

Contents →

Popliteal Artery (deepest)

29

Popliteal vein

Sciatic Nerve to the tibial & common peroneal Nerve

* Popliteal artery is difficult to palpate b/c

II

It is Not superficial & doesn't pass over any bony prominence.

POSTERIOR COMPARTMENT OF LEG

SUPERFICIAL MUSCLE →

Gastrocnemius + Soleus

↳ "Triceps surae"

Klas "Peripheral heart"

b/c it helps in venous return from lower limb

Action → Plantar flexion @ Ankle joint

Gastrocnemius

Soleus

Plantaris

Tendo Achillis

↳ Inserted on Middle 1/3rd of

posterior surface of calcaneum.

Feeble & Rudimentary Muscle; which can rupture during sudden dorsiflexion of Ankle joint.

DEEP MUSCLE →

Muscle

Popliteus

→ Unlocking of the Knee joint

Tibialis posterior

Flexor hallucis Longus

Flexor digitorum Longus

Action

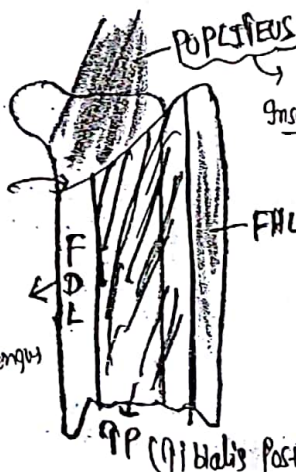
→ Plantar flexion & Inversion

Origin → Lateral surface of lateral condyle of Femur (Intra-capsular)

Insertion → Posterior surface of shaft of tibia over sole line

N. supply → Tibial Nerve

Artery → Post. tibial artery



Soleal Line

Flexor digitorum Longus

FHL (Flexor hallucis Longus)

TP (Tibialis Posterior)

Structure passing behind the Flexor Retinaculum through Navicular tunnel
(Ant. to Posterior)

- Tibialis Posterior

- Flexor digitorum Longus

- Post. tibial A.

- Tibial nerve

Mnemonic → The Doctors Are Not Here

ANTERIOR COMPARTMENT OF LEG

- ① Tibialis Anterior
- ② Extensor hallucis Longus
- ③ Extensor digitorum Longus
- ④ Peroneus tertius

Action \Rightarrow Dorsiflexion @ ankle joint

- Tibialis anterior also causes inversion & acts as a sling for the Medial Longitudinal Arch.

Nerve \Rightarrow Deep peroneal N.

Artery \Rightarrow Ant. tibial A. - after piercing the Interosseous Membrane

Structure passing behind the Extensor Retinaculum

Medial to Lateral \Rightarrow

Tibialis Anterior
Extensor hallucis Longus
Anterior tibial A.
Deep peroneal Nerve
Extensor digitorum Longus
Peroneus tertius

Mnemonic :-

The Himalayas Are Not Dry Plateau

LATERAL COMPARTMENT OF LEG

Muscle \Rightarrow Peroneus Longus

Peroneus brevis

Nerve \Rightarrow Superficial peroneal N.

Artery \Rightarrow Peroneal A. - branch of Posterior tibial A.

Action \Rightarrow Eversion of foot

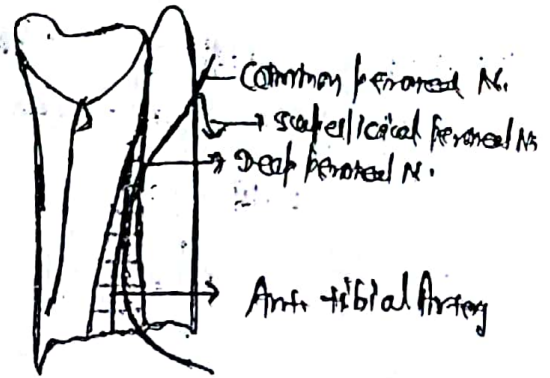
- Act as a sling for the Lateral Longitudinal arch.

* ~~Foot drop occurs either injury to common peroneal Nerve / deep peroneal Nerve~~

* "High stepping / Stomping / Marching" GAIT

Deep peroneal Nerve

It hesitates to cross the Anterior tibial Artery.



Tibialis Posterior

- Winds around the Medial Malleolus.
- chiefly Inserted on Navicular tuberosity.
- sends slips to all the tarsals & Metatarsals except 1st & 5th Metatarsal.
- the tendon which winds around Lateral Malleolus

↳ Peroneus brevis

Inserted on base & tuberosity of 5th Metatarsal bone

Peroneus Longus

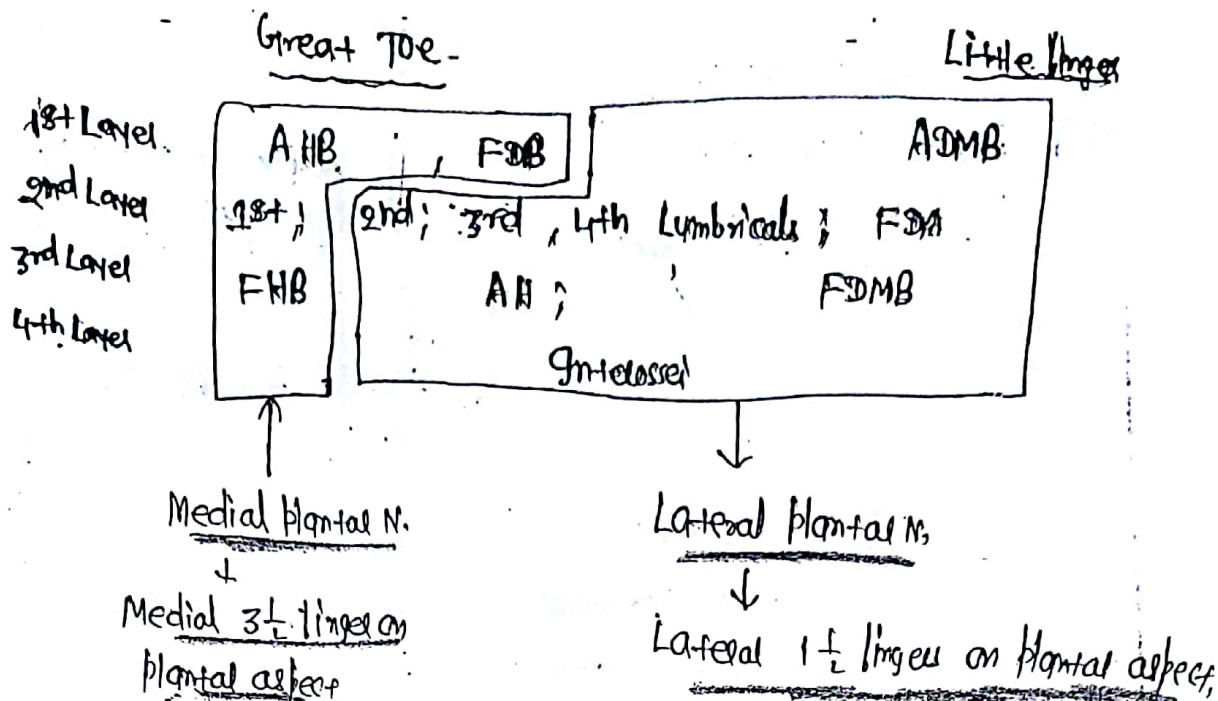
- goes behind the Peroneus brevis till the cuboid; then turns @ Right angle; grooves the cuboid; passes below the bases of Metatarsal bones.

Tibialis Anterior

- Inserted on Lateral aspect of base of the 1st Metatarsal & Medial cuneiform
- Medial cuneiform bone Receives the Insertion of → Tibialis Anterior
Tibialis Posterior
Peroneus Longus

LAYER OF SOLE

- | | |
|--|---|
| Great toe | Little finger |
| 1st Layer ⇒ <u>Abductor hallucis brevis</u> | <u>Flexor digitorum brevis</u> |
| 2nd Layer ⇒ <u>FHL; FSL; Lumbicals</u> | <u>Abductor digiti minimi brevis</u> |
| 3rd Layer ⇒ <u>Flexor hallucis brevis</u> | <u>Flexor digitorum profundus</u> <u>Quadratus plantae</u> |
| 4th Layer ⇒ <u>Tibialis Posterior</u> ; <u>Peroneus Longus</u> | <u>Flexor digiti minimi brevis</u> |
| | <u>Adductor hallucis</u> |
| | <u>Intensor</u> |
| | ↳ 4 Dorsal ↳ 3 Plantar |



* Strongest Ligament @ Hip Joint

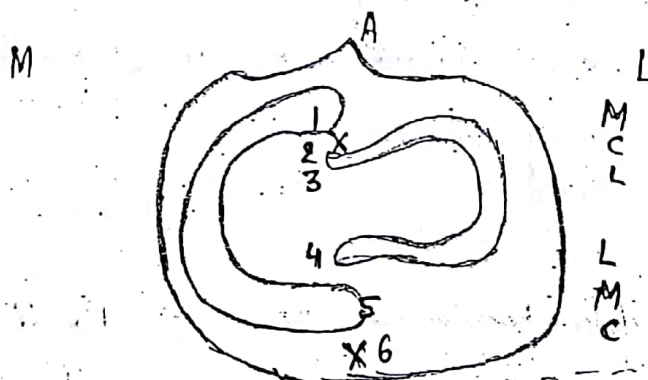
the stem of "Y" is attached to Anterior inferior iliac spine; two limbs are attached to intertrochanteric line

⇒ Ilio-femoral Ligament of Bigelow

↓
 ← Inverted "Y" shaped

↳ prevents hyperextension @ Hip joint
 prevents trunk to be falling down backward.

* Structure attached to Intercondylar eminence of Tibia ⇒



- ① Anterior horn of Medial Meniscus
- ② Anterior cruciate Ligament
- ③ Anterior horn of Lateral Meniscus
- ④ Posterior horn of Lateral Meniscus
- ⑤ Posterior horn of Medial Meniscus
- ⑥ Posterior cruciate Ligament

→ Attach to the posterior aspect of Medial surface of Lateral condyle
 → Prevents Anterior displacement of tibia on Femur
 → Gets tight during extension

PCL (Intra capsular & extrasynovial)
 → Attach to Anterior aspect of Lateral surface of Medial condyle
 → Prevents the posterior displacement of tibia on Femur

See page 1 & last page after this page

THORAX

— Head of the Rib articulates w the body of thoracic verte



via "Costo-vertebral joint"

— Tubercle of the Rib articulates w transverse process



"Costo-transverse joint"

— Shaft of the Rib articulates w costal cartilage



"Costochondral joint"

Bucket-handle movement changes \Rightarrow Transverse diameter of thorax

Pump-handle movement changes \Rightarrow AP diameter of thorax

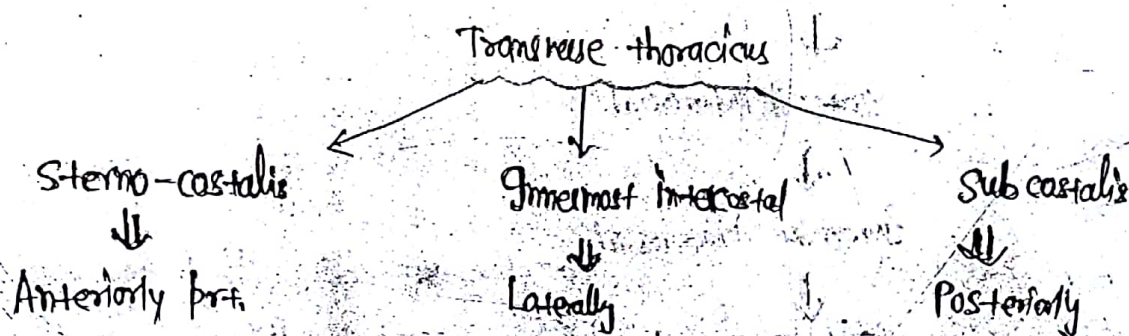
Contraction of diaphragm changes \Rightarrow vertical diameter of thorax.

* Ossification of Ribs begins Near the Angle towards the end of 2nd month (Arms 8th week) of Fetal Life & is seen firstly in 6th & 7th Ribs.

Intercostal space

Intercostal Muscles \Rightarrow EICM

IICM



* The Neurovascular plane of thorax lies b/w internal & innermost intercostal in the costal groove along inferior border of the Rib
(Vern \rightarrow Artery \rightarrow Nerve)

→ This sequence is Reversed in 1st Rib (N → A → V)

* Neurovascular plane of body ⇒

| | | | | |
|-------------------|----------------------|----------------------|---|-----------------------|
| Neck | Scalenus Posterior | Scalenus Medius | } | Scalenus Anterior |
| Thorax | External intercostal | Internal intercostal | } | Innermost intercostal |
| Abdomen | External oblique | Internal oblique | } | Transverse abdominis |
| <u>MESF 02/12</u> | | | | |

* Structures pierced during pleural tapping in mid-axillary line ⇒

Skin
↓
Superficial fascia
↓
Deep fascia
↓
Serratus Anterior
↓
External intercostal
↓
Internal intercostal
↓
Innermost intercostal
↓
Endo-thoracic fascia
↓
Parietal pleura

AL-15 * While doing thoracocentesis, it is advisable to introduce Needle along - Upper border of the Rib.

Internal thoracic Artery

- Branch of 1st part of Subclavian A.
- Lies on either side of the sternum;
- At the 6th ic space divides into →

Superior epigastric



enters the abdomen through

"Foramen of Morgagni" / Space of Lamy"

Musculophrenic



• Supplies the Intercostal muscle & diaphragm

• gives Anterior ic arteries in lower spaces

- Anastomosis with the Inferior epigastric A. ; which is the branch of external iliac A.

Anterior Intercostal Artery

- In the upper six ^{ic} spaces a branches of Internal thoracic Artery.
- In the Lower spaces the branches of Musculophrenic Artery.
 ↳ i.e 7th - 9th ic spaces
- There are two Anterior Intercostal arteries in each space

Posterior Intercostal Artery

- In the ^(3rd - 11th) Lower ic spaces are branches of descending thoracic Artery
- In the upper two spaces they are branches of

Superior Intercostal A.



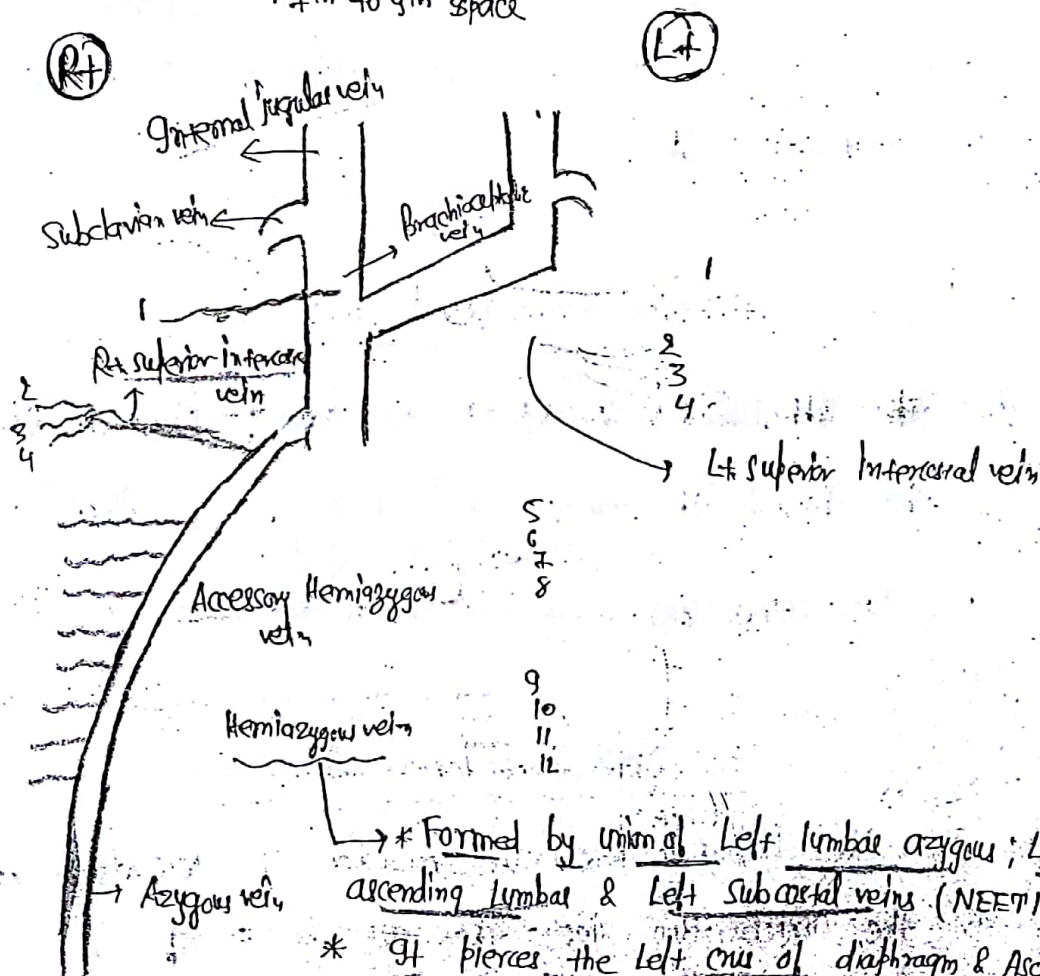
branch of costal-cervical trunk

Branch of 2nd part of Subclavian A.

- There is one Posterior ilc Arteries in each space.
- At the angle of Rib it gives a Collateral branches.
- The two Posterior ilc Arteries Anastomose to two Anterior ilc Arteries @ the Costo-chondral Junction,
- Rt. Posterior ilc artery are longer than the Left.

Anterior Intercostal veins

- In the upper six spaces drains into → Internal thoracic vein
- In the Lower spaces drains into → Musculophrenic vein
↳ 7th to 9th space



* Formed by union of Left lumbar azygos; Left ascending lumbar & Left Subcostal veins (NEET 16)

* It pierces the Left crus of diaphragm & Ascends up to 7th level; where it turns to Right & joins Azygos vein.

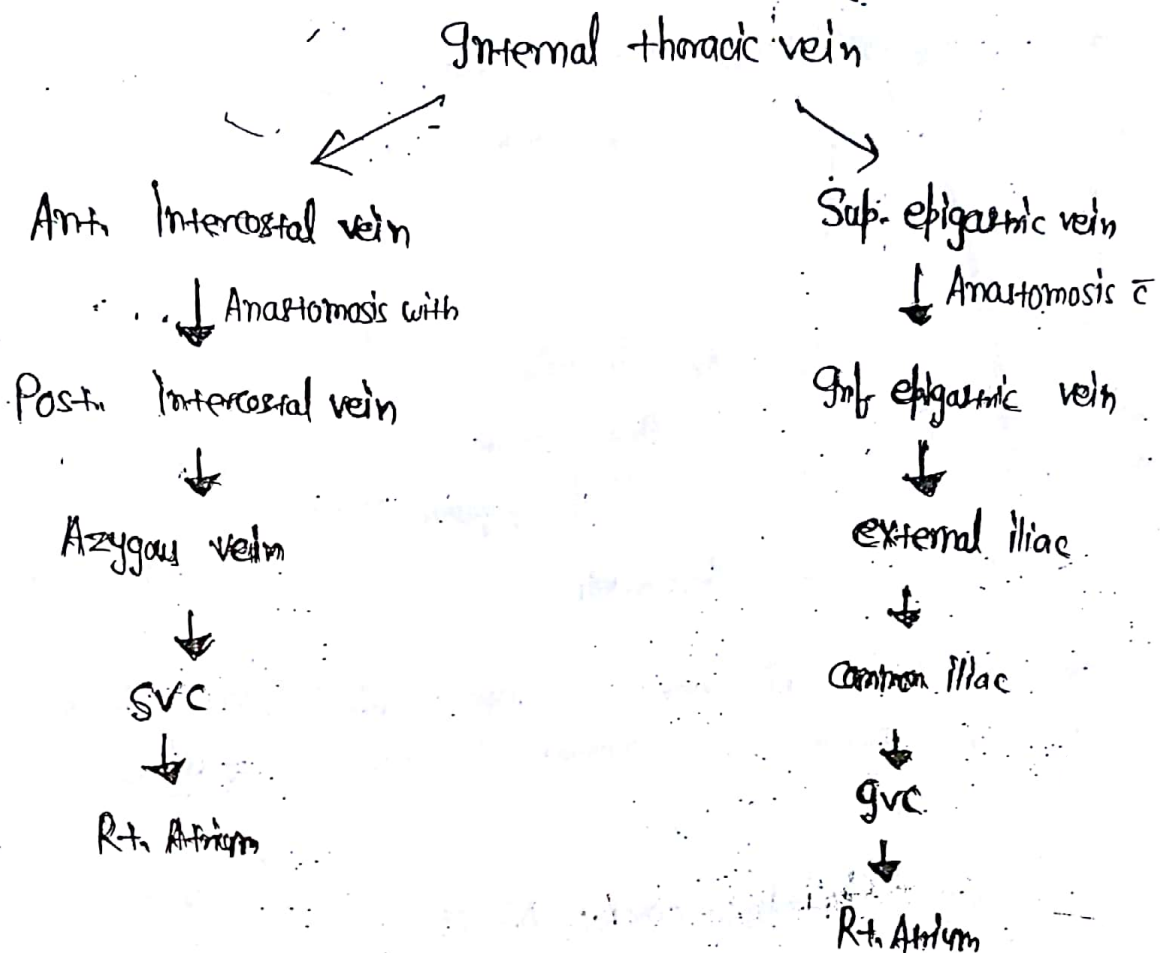
NEET It drains 9th to 11th left posterior ilc veins & esophageal veins

* Rt. branchial veins drains into Azygos vein & Left branchial veins drain into Left superior intercostal or hemiazygos vein

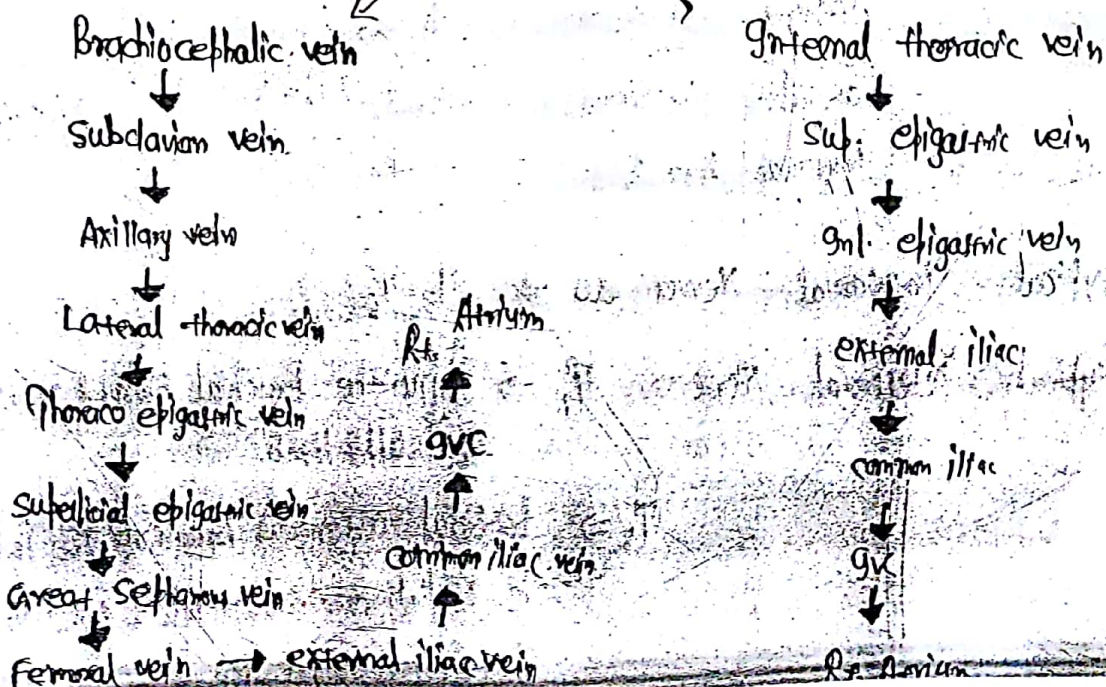
Q8

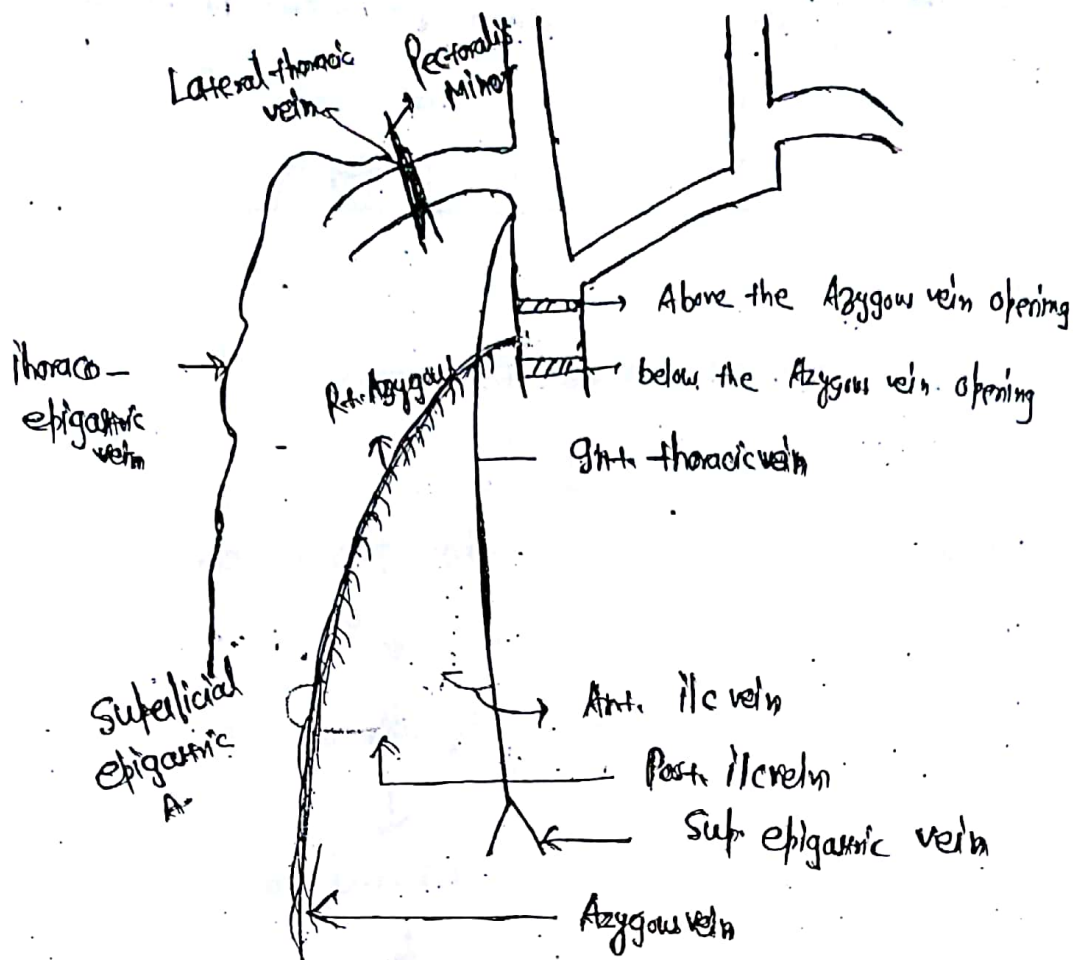
Internal thoracic veins are tributaries of \Rightarrow Brachiocephalic vein

Obstruction to the SVC above the opening of Azygous vein \Rightarrow



Obstruction to the SVC below the opening of Azygous vein \Rightarrow





* Trachea & Bronchii have cartilage (hyaline cartilage) in their walls; while wall of bronchioles & terminal bronchioles don't contain cartilage.

Intercostal Nerve

- It is the ventral Ramus of a thoracic spinal Nerve
- Branches \Rightarrow Antero-cutaneous branch; Lateral-cutaneous branch; Muscular branch; Anything else if it is supplying; it is \Rightarrow Atypical
- Typical Intercostal Nerves are $\Rightarrow T_3 - T_6$
- Atypical Intercostal Nerve $\Rightarrow T_1 \Rightarrow$ joins the brachial plexus & supplies the upper limb.
 $T_2 \Rightarrow$ Lateral cutaneous branch of T_2 joins C Medial cutaneous Nerve of Arm via Intercostobrachial Nerve

→ The Lower ilc Nerves supplies the Muscle of Anterior Abdominal wall (T₇-T₁₂).

- * Parietal pleura is pain sensitive & supplied by ilc & Phrenic Ne
- * visceral pleura is pain insensitive & supplied by Autonomic Nerv

PLEURA & LUNG

| | Mid-clavicular | Mid-axillary | Mid-scapular |
|-----------------|----------------------|-----------------------|-----------------------|
| <u>LUNG</u> → | 6 th Ribs | 8 th Ribs | 10 th Ribs |
| <u>PLEURA</u> → | 8 th Ribs | 10 th Ribs | 12 th Ribs |

- * Pulmonary / visceral pleura is supplied by Sympathetic (T₂-T₆ segm) & Parasympathetic (Vagus N.)
- * The Mediastinal & diaphragmatic pleura are supplied by Phrenic Nerve
- * The costal & cervical pleura are supplied by Intercostal Nerve
- * Apex of the lungs projects 5 cm above the 1st Rib & 2.5 cm above the clavicle.
 - ↳ covered by Cervical pleura
 - ↳ Further covered by Sibson's fascia / Cervicophrenic membrane

NEET 18

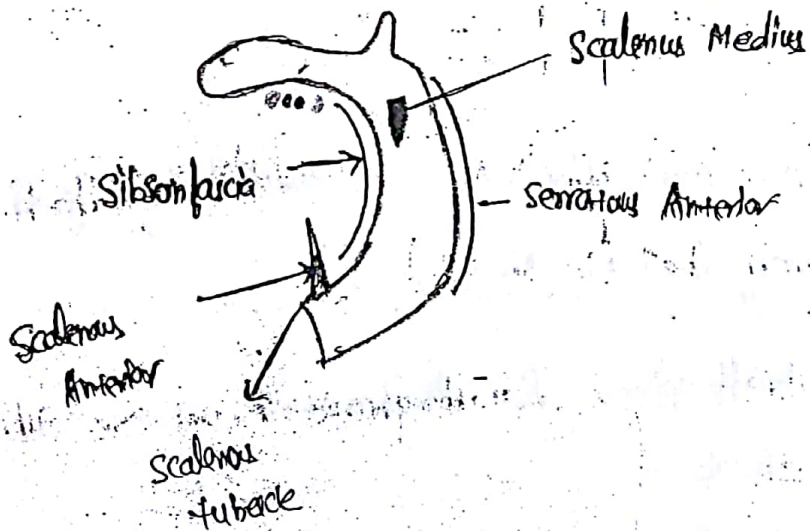
Sibson's fascia \Rightarrow Extends from transverse process of C_7 to inner border of 1st Rib laterally.

Oral-diaphragm \Rightarrow Formed by Mylohyoid;

Pelvic-diaphragm \Rightarrow Formed by Levator Ani;

Urogenital-diaphragm \Rightarrow Formed by Sphincter Urethral
Deep transverse perineal

\rightarrow Structure attaches to the 1st Rib \Rightarrow



CHASSAIGNAC TUBERCLE \Rightarrow Ant. tubercle of transverse process of C_6 vertebrae

Relation of the Neck of 1st Rib \Rightarrow

- ① Sympathetic chain
- ② 1st Posterior ilc vein
- ③ Sub. intercostal Artery
- ④ 1st thoracic Nerve

SVAN (Med - Lateral)

Relation of Ala of Sacrum \rightarrow

Sympathetic chain

SL10 (Med + Lateral)

Lumbosacral trunk

9th Lumbal Artery

Obturator Nerve

* TRUE RIBS \rightarrow Directly articulates \bar{c} sternum through costal cartilage eg = 1st to 7th Ribs

* FALSE RIBS \rightarrow 8th to 12th Ribs don't articulate directly \bar{c} the sternum.

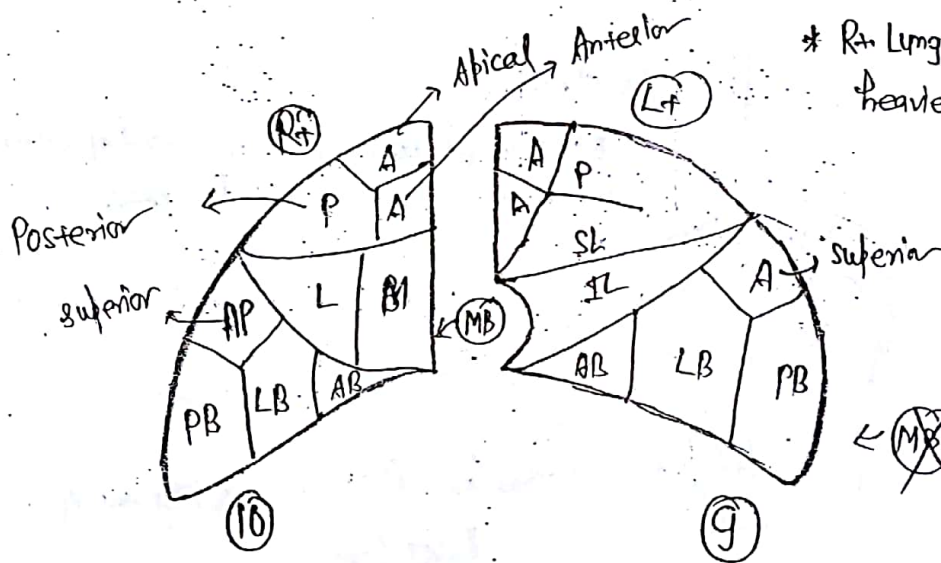
NEE18 \Rightarrow 8th, 9th & 10th Ribs are attached to 7th Ribs by \Rightarrow Synovial joints.

* 11th & 12th Ribs have No costal cartilage & they have Anterior ends (Floating Ribs).

\rightarrow Surgically Resectable.

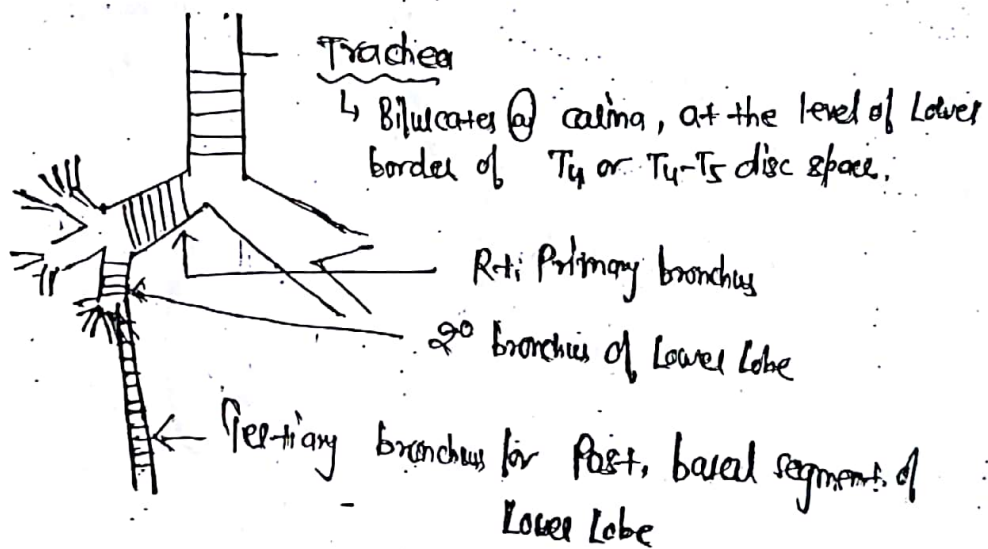
BRONCHOPULMONARY SEGMENT \Rightarrow Largest Subdivision of a Lobe

Part of the Lung supplied by one tertiary branches.



* Rt Lung is shorter, wider & heavier (625g) than Left Lung (555g)

- Each broncho pulmonary segment is conical in shape
 - It has 1-8 — Pulmonary Artery & Tertiary bronchus.
 - The Pulmonary veins are — Intersegmental.
 - A foreign body entering the Nose; enters into Posterior basal segment of the Right Lung.
 - Aspiration Pneumonia is common in ⇒
 - Apical segment of Lower lobe / superior segment of Lower lobe OR Posterior segment of upper lobe
- ble of most dependent part of Lung while in supine position. ←



- * Structure which arches \bar{c} the hilum of Rt. Lung ⇒ Azygos vein
- Structure which arches \bar{c} the hilum of Lt. Lung ⇒ Arch of Aorta
- Nerve in front of hilum ⇒ Phrenic N.
- Nerve Behind hilum ⇒ Vagus N.

BB
* Bronchial Arteries supply the Lung till the beginning of Respiratory bronchiole (conducting part) & then Anastomose \bar{c} Pulmonary arteries

HEART & PERICARDIUM

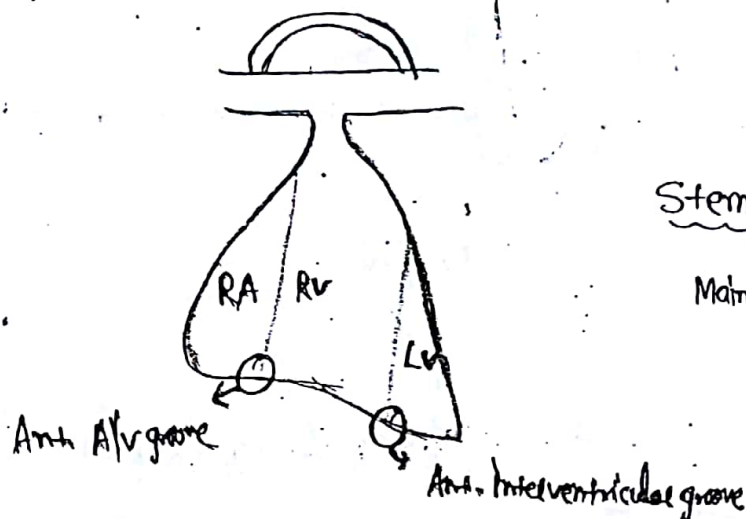
Sternocostal surface of heart \Rightarrow

\hookrightarrow Sympathetic innervation of heart

\hookrightarrow T₁-T₅ (cardio stimulatory)

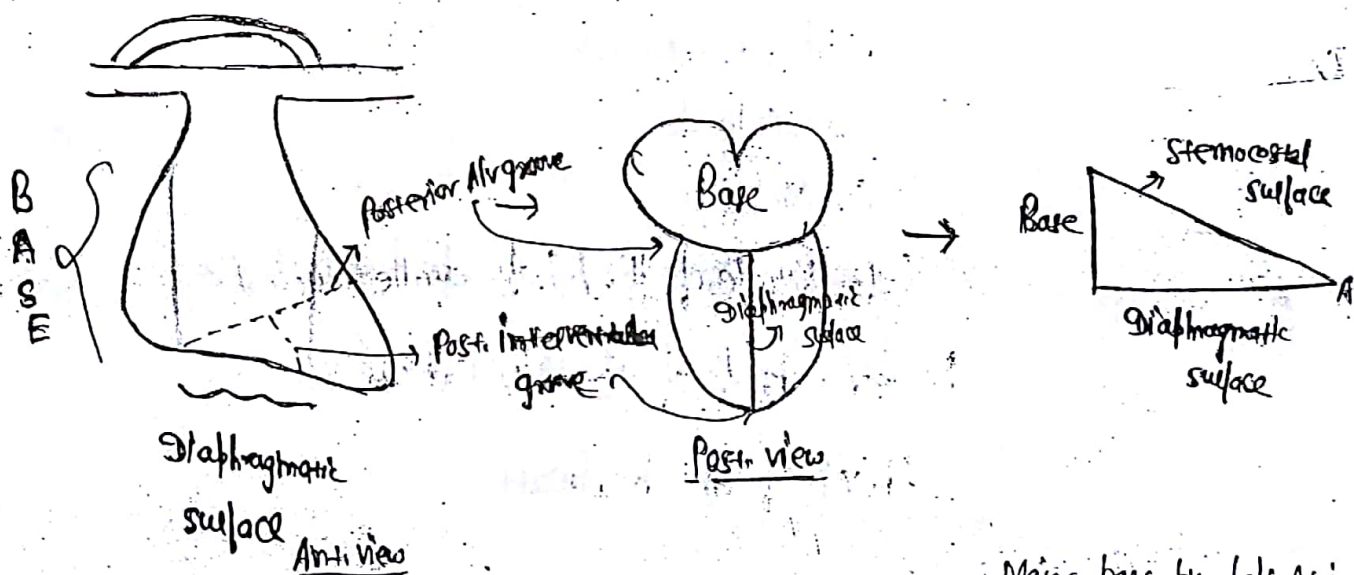
* Parasympathetic innervation of heart

\hookrightarrow Vagus Nerve (cardio inhibitory)



Sternocostal surface of heart

Main part \Rightarrow Rt. ventricle



* Base of the heart is formed by \Rightarrow Both the Atria
 * The groove which separate Base from Diaphragmatic surface

* Apex of the heart is formed by \Rightarrow Left ventricle

Right Ventricle \Rightarrow Most Anterior (sternocostal) surface of heart; it forms inferior border of heart.
 • Triangular in shape; In cross-section it appears like a crescent.
 • wall thickness \Rightarrow 3-5mm

* Trigonum Fibrosum Sinistrum \Rightarrow

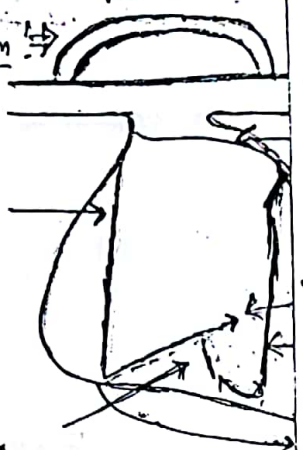
Fibrous tissue b/w Aortic & Mitral Rings

* Trigonum Fibrosum Dextrum \Rightarrow

Fibrous tissue b/w AV Rings
& Aortic Rings

RCA

Post. gl/v
br. of RCA



Aortic Valve

• MITRAL \rightarrow

Surface Marking
Sternal end of Left 4th
costal cartilage

• TRICUSPID \rightarrow

Right half of sternum along
4th & 5th intercostal spaces

• AORTIC \rightarrow

Sternal end of Left 3rd
costal cartilage

• PULMONARY \rightarrow

Sternal end of Left 3rd
costal cartilage (upper end)

Auscultatory Area

cardiac Apex.

Right lower end
of sternum.

Right 2nd inter-
costal space

Left 2nd inter-
costal space

Right coronary Artery (RCA)

Supplies \Rightarrow

Right Atrium ;

Right ventricle ;

SA Node ;

AV Node

Left Bundle of His (Left bundle branch)

Posterior 1/3rd of the i/v septum

Apex - of the heart

LCA (Left coronary Artery)

Supplies \Rightarrow

Left Atrium

Left ventricle

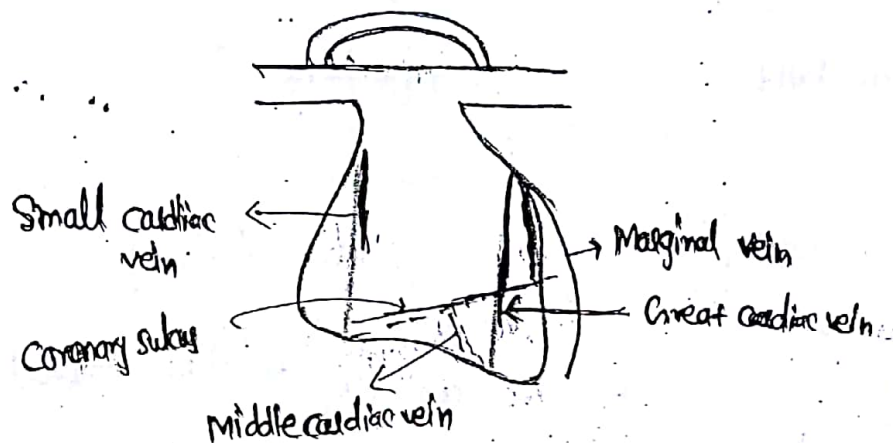
Left & Right Bundles of His

Anterior 2/3rd of i/v septum

Apex of the heart

- * The Posterior ilv artery is the branch of Rt. Coronary
In 85% of the cases \Rightarrow Rt. - coronary dominance
- * if it is a branch of circumflex \Rightarrow Lt. coronary dominance
- * if both gives this branch \Rightarrow co-dominance

VEINS OF HEART



Q Coronary Sulcus is \Rightarrow Posterior A/V Groove

Q All the veins drains in coronary sinus except

Anterior Cardiac vein
Vene cordae Minimi (Thebesian vein)

\downarrow drain into
Rt. Atrium

- * Oblique Sinus of the pericardium lies behind Lt. Atrium.
 \rightarrow to accommodate more blood coming from Pulmonary veins

Right Atrium

- The Line joining SVC to RVC from outside is k/a "Sulcus terminalis"
- The Same Line from inside is k/a "Crista terminalis"
- It divides Rt Atrium

↙
Rough part



Shows structure similar to teeth of comb



k/a "Musculus Pectinatus"

↘
Sof part



Shows the opening of

- SVC } Guarded by Eustachian valve
- RVC }

- Coronary sinus - Guarded by Thebesian valve

- Fossa ovalis is Represented by "Septum primum"
- Limbus Fossa ovalis is Represented by "Septum secundum"

Triangle of Koch

Boundaries

- ① Septal Leaflet of Tricuspid valve

② opening of coronary sinus

③ Tendon of nodal

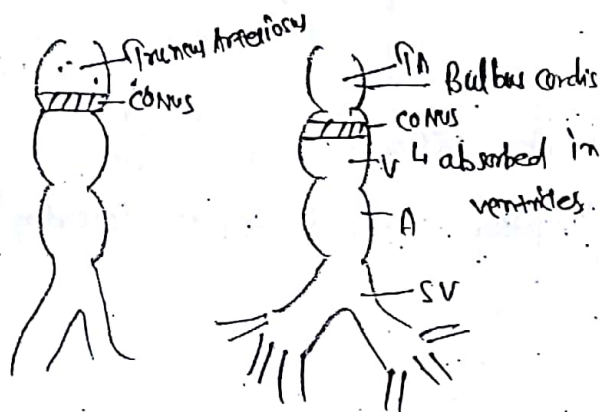
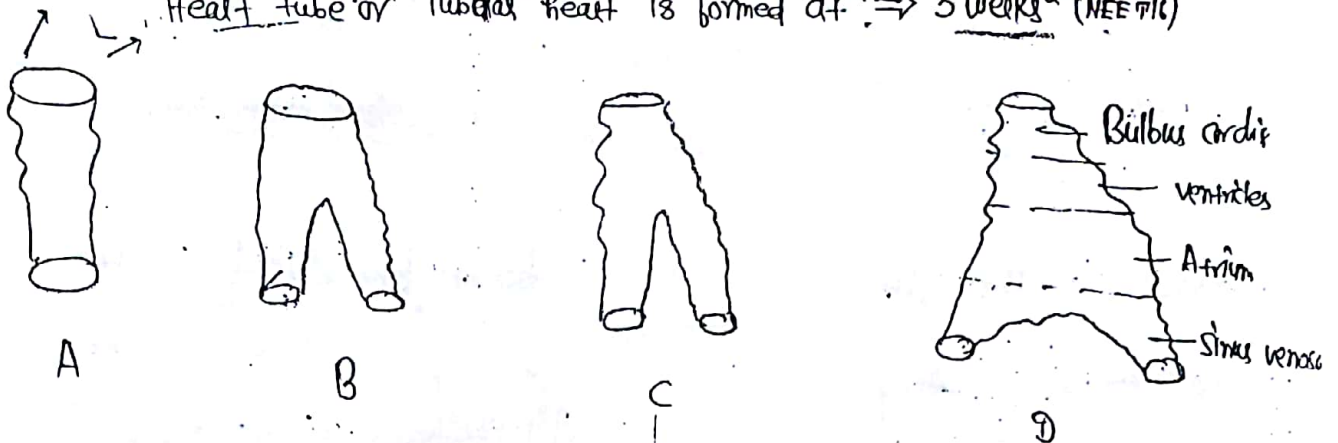
- AV Node lies in this triangle

- SA Node lies in the junction of SVC & Rt Atrium

Embryology of Heart & Blood vessels

Heart tube is formed by Hyaluronic acid secreted by Myocardium (NEET 16)

Heart tube or Tubular heart is formed at \Rightarrow 3 weeks (NEET 16)



Development of Right Atrium \Rightarrow

PART

- Smooth Posterior wall \rightarrow Right horn of Sinus venosus
- Rough Anterior wall \rightarrow Primitive Atrial chamber
- Interatrial septum \rightarrow Septum primum & secundum

SERIVED FROM

- Sinus form \Rightarrow Portal vein, Hepatic vein, enteric vein & hepatic segment of IVC
- develops from \Rightarrow Right vitelline vein
- Left vitelline vein & Dorsal Anastomosis etc.

* Veins draining in the Sinus venosus

- ② Vitelline from Yolk sac;
- ③ Common cardinal from body wall

* Fate of Sinus venosus \Rightarrow The R. & Left horn of Sinus venosus opens in the Atrium through Sino atrial orifice

- The Left horn becomes small in size; gets detached from the atrium forms coronary sinus and now opens into the R. horn.

- The Right horn is absorbed into the atrium \Rightarrow Septum secundum

It is bounded by Left & Right Venous valve

• The Left horn is Interatrial septum & Dorsal Anastomosis etc.

Interventricular septum

Muscular part



Grows in the floor of
the ventricular cavity

Membranous part



derived from ④ Bulbar septum
⇓
Formed in canus

⑤ Proliferation of AV cushion.

- Final closure of foramen ovale occurs d/t fusion of
"Septum primum & Septum secundum"

Truncus Arteriosus

⇒ The Aortico-pulmonary septum
divides the truncus arteriosus into
Ascending aorta & Pulmonary trunk.

- Failure of Migration of Neural crest cells in this segment

Results in

① TOF ⇒ M/c cyanotic congenital heart defects

↳ occurs when septum shift Anterior & to the
Right; leading to ⇒ Pulmonary stenosis

RVID

Membranous i/v septal defect
overriding of Aorta

②

Transposition of great vessel ⇒

↳ occurs when septum fails to develop into
spiral manner

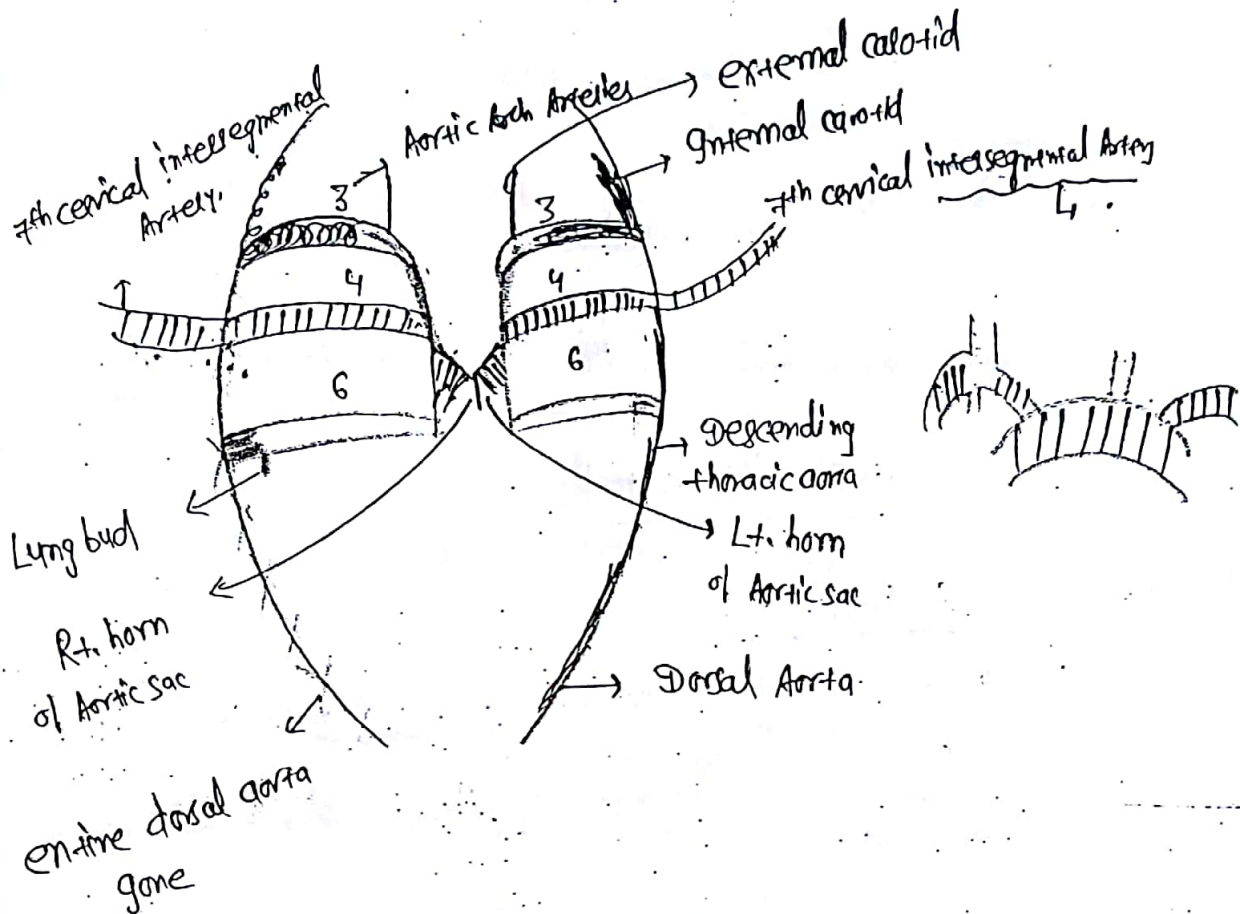
Aorta Arise from R ventricle

M/c of cyanosis immediately
after birth

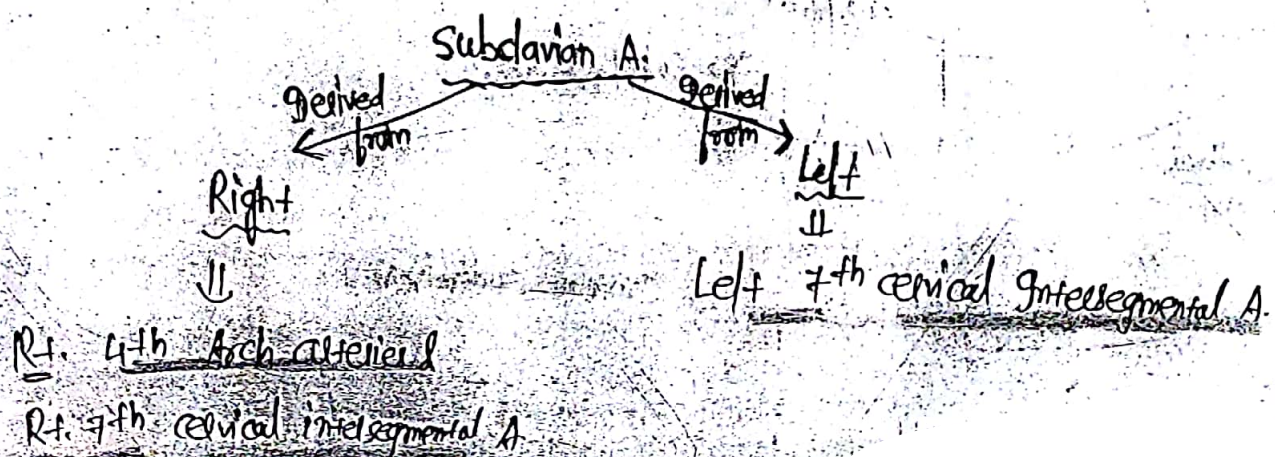
③

Persistent Truncus Arteriosus ⇒

↳ occurs when septum fails to develop, a single vessel carry blood from both ventricles.

ARCH OF AORTA

derived from → Left horn of Aortic sac & the left 4th arch Artery



Brachiocephalic trunk

derived from \Rightarrow Rt. horn of Aortic sac

Pulmonary Arteries

derived from - 6th arch arteries

Ductus Arteriosus

derived from - Left 6th arch arteries b/w Lung bud & the dorsal Aorta

Common carotids

derived from - 3rd Arch arteries

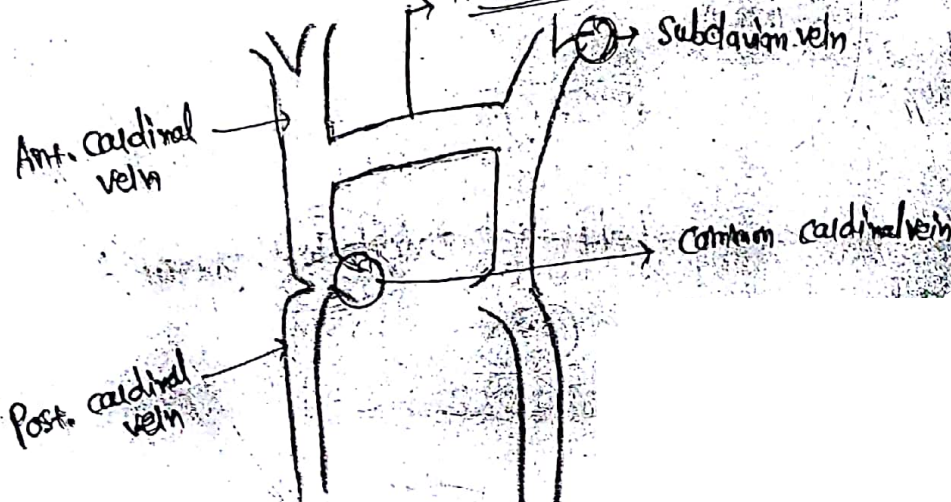
- it gives a bud for external carotid & itself continues as internal carotid along with dorsal Aorta

Descending thoracic Aorta

- derived from Left dorsal Aorta

Development of vein

Anastomosis



Internal Jugular vein

- derived from Ant. cardinal vein above the attachment of subclavian vein.

Right Brachiocephalic vein

Derived from \Rightarrow Rt. Ant. cardinal vein b/w subclavian vein & Anasto

Lt. Brachiocephalic vein

Derived from \Rightarrow Lt. Ant. cardinal vein subclavian vein & Anastomosis & Anastomosis itself

Superior vena cava

derived from \Rightarrow Rt. Anterior cardinal vein below Anastomosis;
Rt. Common cardinal vein

- A left sided svc drains into \Rightarrow Coronary Sinus

Develops from \Rightarrow Coronary Sinus

- Lt. common cardinal vein
- Lt. horn of Sinus venosus

* Left Superior i/c vein \Rightarrow derived from left Anterior cardinal vein below the anastomosis
Proximal part of left posterior cardinal vein.

Diaphragm

derived from \Rightarrow

Septum transversum

Dorsal & ventral Mesentery of oesophagus;

Body wall

Pleuro-peritoneal Membranes

Muscles are derived from \Rightarrow Cervical Myotomes

Bochdalek's Hernia \Rightarrow A posterolateral defect in the development of diaphragm due to Non-fusion of pleuro-peritoneal Membrane.

Root of

Lies opposite to T's

Arrangement of structures

Anterior to Posterior \rightarrow

(V-A-B)

Relations of the Root of the Lung

Anterior \Rightarrow common on both side \Rightarrow • Phrenic Nerve
• Pericardiophrenic vessels
• Anterior pulmonary plexus

on Rt. side \Rightarrow • SVC
• Part of Rt. Atrium.

Posterior \Rightarrow common on both side \Rightarrow • Vagus Nerve
• Posterior pulmonary plexus

on left side \Rightarrow • Descending Thoracic Aorta

Superior \Rightarrow on Rt. side \Rightarrow Terminal part of Azygos vein

on left side \Rightarrow Arch of Aorta

Inferior \Rightarrow Pulmonary Ligament

Branches

Superior to Inferior \rightarrow

Right

• Pulmonary Artery
• Bronchus (1st Branch)
• Pulmonary vein

Left

• Eparterial bronchus (superior Most)
• Pulmonary Artery
• Hyparterial bronchus
• Inferior pulmonary vein (inferior Most)

MEDIASTINUM

- Middle space left in thoracic cavity in b/w the Lungs.
- divides into Superior & Inferior by a imaginary line from sternal Angle to lower border of T₄. (NEET'16).

(I) Superior Mediastinum ⇒

Retrosternal

- Sternohyoid Muscle
- Sternothyroid Muscle
- Thyroid

Intermediate

- Formation of SVC
- Arch of Aorta & its branches
- Vagus & Phrenic N.

Pre-vertebral

- Trachea (10-15 cm Long)
- Esophagus
- Left Recurrent Laryngeal N.
- Thoracic duct

(II) Inferior Mediastinum ⇒

Anterior

- Superior & Inferior sterno-pericardial Ligaments

Middle

- Heart & Pericardium
- Bifurcation of Trachea
- Ascending Aorta
- Rt. & Lt. Pulmonary vein
- Phrenic Nerve

Posterior

- Esophagus
- Thoracic duct
- Descending thoracic Aorta
- Azygous vein
- Splanchnic Nerve from lower 8 thoracic ganglia
- Hemiazygous vein & Accessory he ganglia

Anatomical Landmarks

NUMBER

* ESOPHAGEAL CONSTRICTIONS

| NUMBER | Distance from Incisor | Bony Level | Anatomical Landmarks |
|--------|------------------------------|-----------------|---|
| 1 | 15 cm (6 inch) | C ₆ | At its beginning (Pharyngo-esophageal junction) |
| 2 | 22.5 cm (9 inch) | T ₄ | crossing of Aortic Arch |
| 3 | 27.5 cm (11 inch) | T ₆ | crossing of Left Main Br |
| 4 | 37.5 cm - 40 cm (15-16 inch) | T ₁₀ | Piercing diaphragm (At L4) |

* INTER-ATRIAL SEPTUM

- Septum primum grows from the wall of the Atrium towards the A-v cushion.
- opening b/w them is k/as \rightarrow "Foramen primum".
- Septum primum lues \bar{c} the A-v cushion & breaks off
 \Downarrow
 this opening is k/as "Foramen secundum"
- Another Septum starts to grow from wall of the Atrium
 \Downarrow
 k/as "Septum secundum"
 \Downarrow
 - Lies Next to Septum primum.
 - opening b/w them is k/as "Foramen ovale".
- Final closure of Foramen ovale occurs d/t fusion of Septum primum & Septum secundum.

ASD (Atrial septal Defect)

1. Septum secundum type of ASD \Rightarrow M/c ASD
 - Occurs d/t excessive Resorption of Septum primum or Underdevelopment or Reduced size of Septum secundum.
2. Septum primum type of ASD \Rightarrow
 - Failure of Septum primum to lue \bar{c} endocardial cushion.
 - May be combined \bar{c} defects of endocardial cushion.

NEET '16

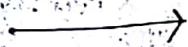
* BLOOD SUPPLY OF ESOPHAGUS

PART OF ESOPHAGUS

ARTERIAL SUPPLY

VENOUS DRAINAGE

Cervical



Inferior thyroid Artery

Inferior thyroid vein

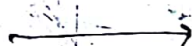
Thoracic



Esophageal branch of descending thoracic Artery
Branchial Arteries

Azygos vein

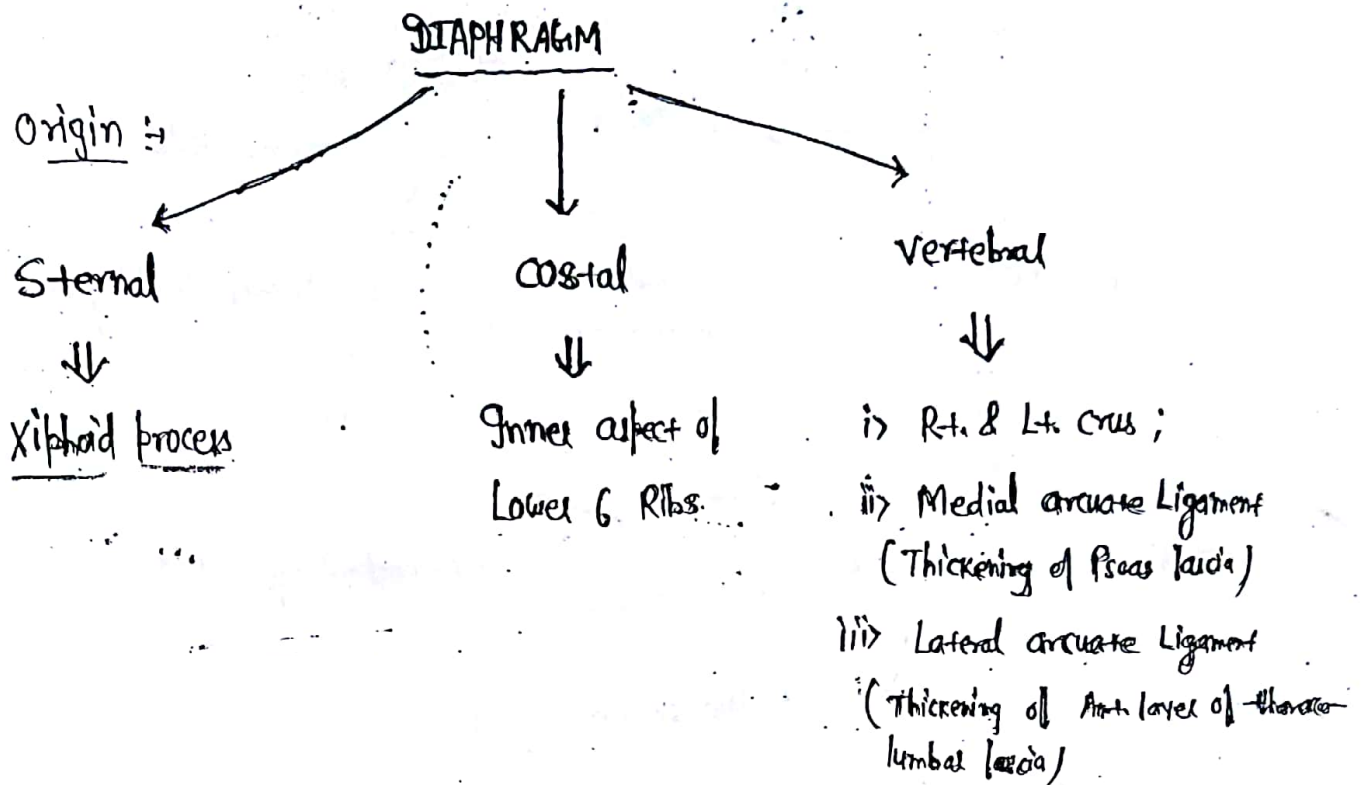
Abdominal



Left gastric Artery
Left Inferior phrenic Artery

Left gastric vein

ABDOMEN & PELVIS



Insertion ⇒

Central tendon * AIIMS NOV17

caudal opening @ the level of T₈ vertebral
passes through the central tendon of diaphragm

Openings of diaphragm ⇒

T₈ ⇒ gvc ; Rt. Phrenic Nerve

Part of diaphragm

Central tendon (AIIMS 17)

T₁₀ ⇒ Esophagus ; Rt. & Lt. vagus

Muscular portion derived from Right crus & Left crus

T₁₂ ⇒ Aorta ; Azygos vein & thoracic duct

Blw Right & Left crus
(Posterior to diaphragm)

* The Sympathetic chain enters the Abdomen behind Medial Arcuate Ligament

* The Subcostal Nerve & vessels enter behind Lateral Arcuate Ligament

* Foramen of Morgagni / space of Lamey - A small defect b/w sternal & costal origin of diaphragm. The superior epigastric vessels enter the abdomen through this gap.

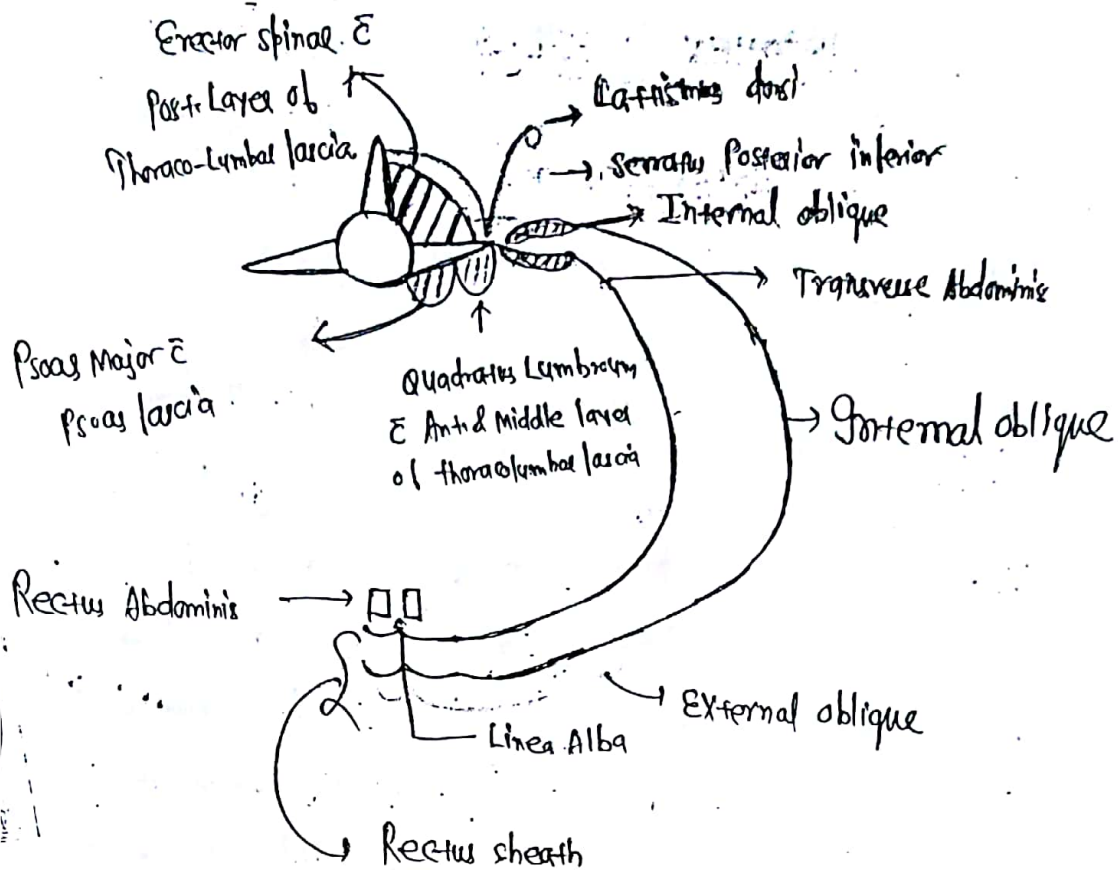
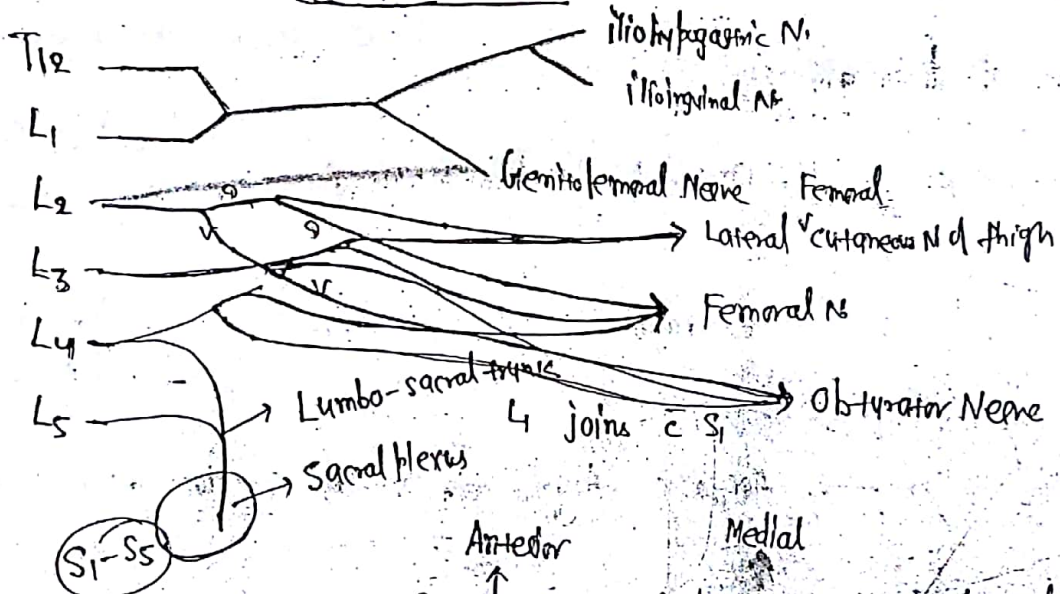


Fig: Posterior Abdominal wall (cut section of Abdomen)

→ Formed from Anterior Rami of L₁-L₄; inside Psoas Major Muscle & also from T₁₂.

LUMBER PLEXUS

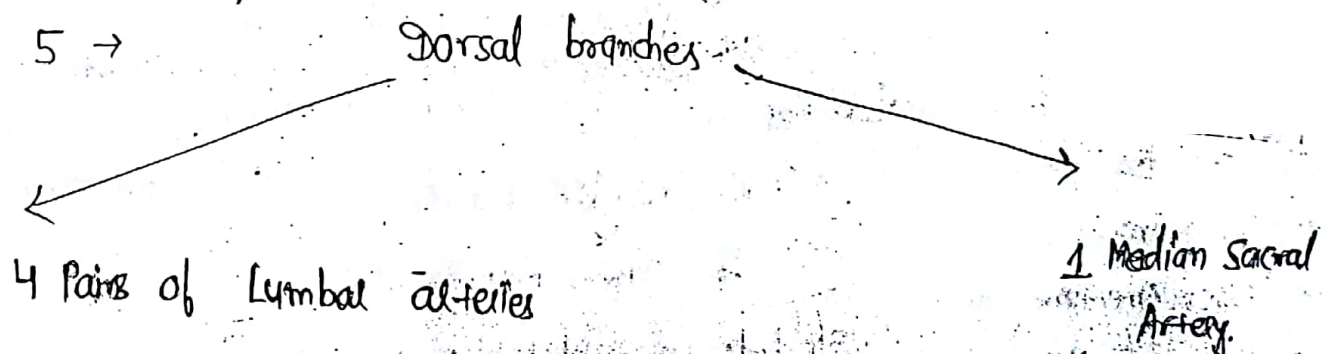
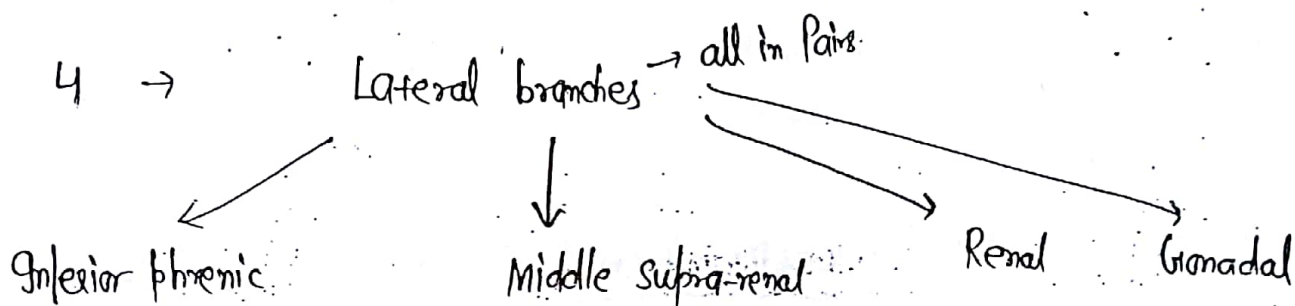
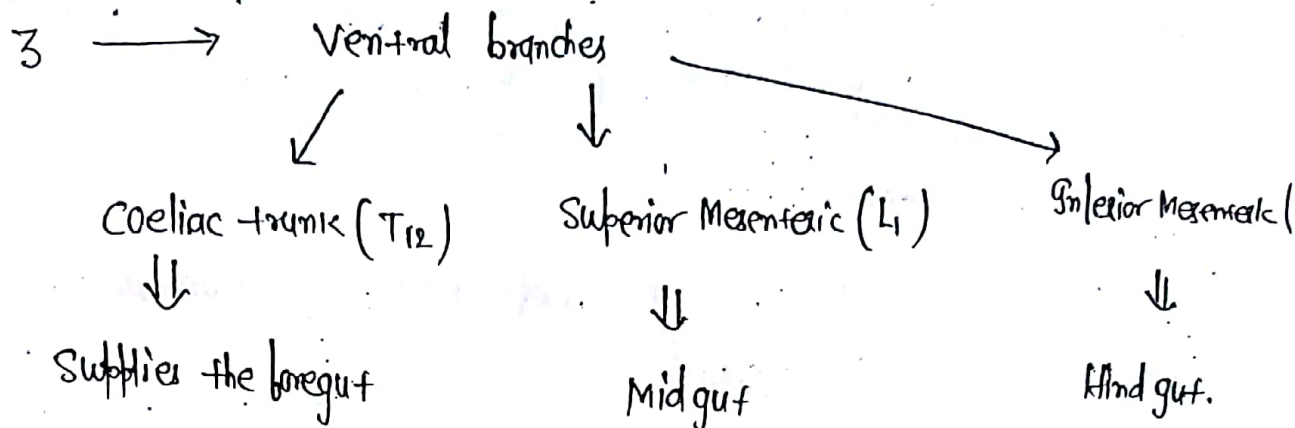


- * All the Nerve except → Genitofemoral & obturator emerge lateral to Psoas Major.
- * Nervus Iugalis → L₄ (takes part in the formation of Lumbar & Sacral plexus)
- * Largest branch of Lumbar plexus → Femoral N.
- * N. lying in Ilio-Psoas groove → Genitofemoral N.

Abdominal Aorta & its branches (2,3,4,5)

89

2 → Terminal branches at L₄ — Common iliacs



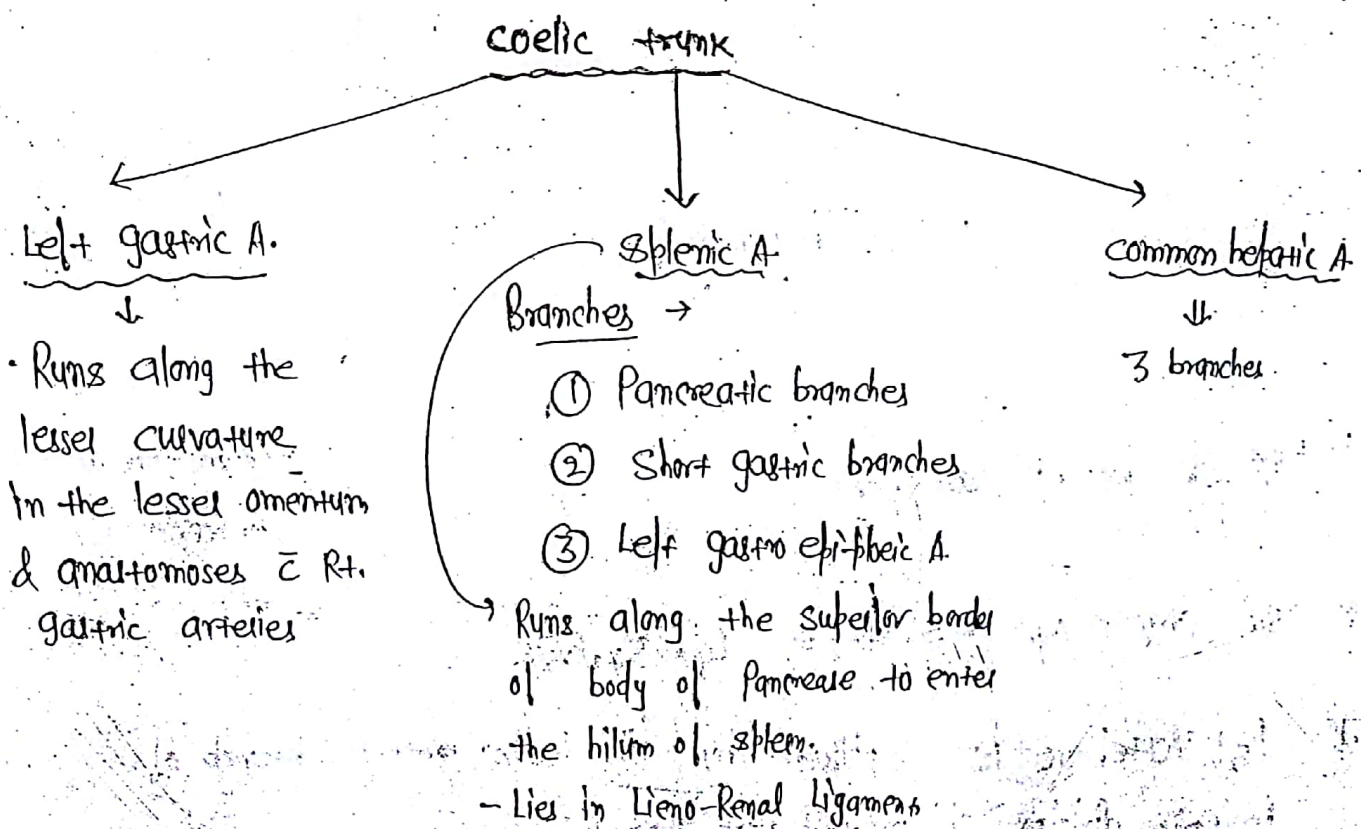
* Nutcracker sign's refer to ⇒ Left Renal vein.

* L₅ Vertebrae is supplied by ilio-lumbar artery, branch of posterior division of Internal iliac Artery.

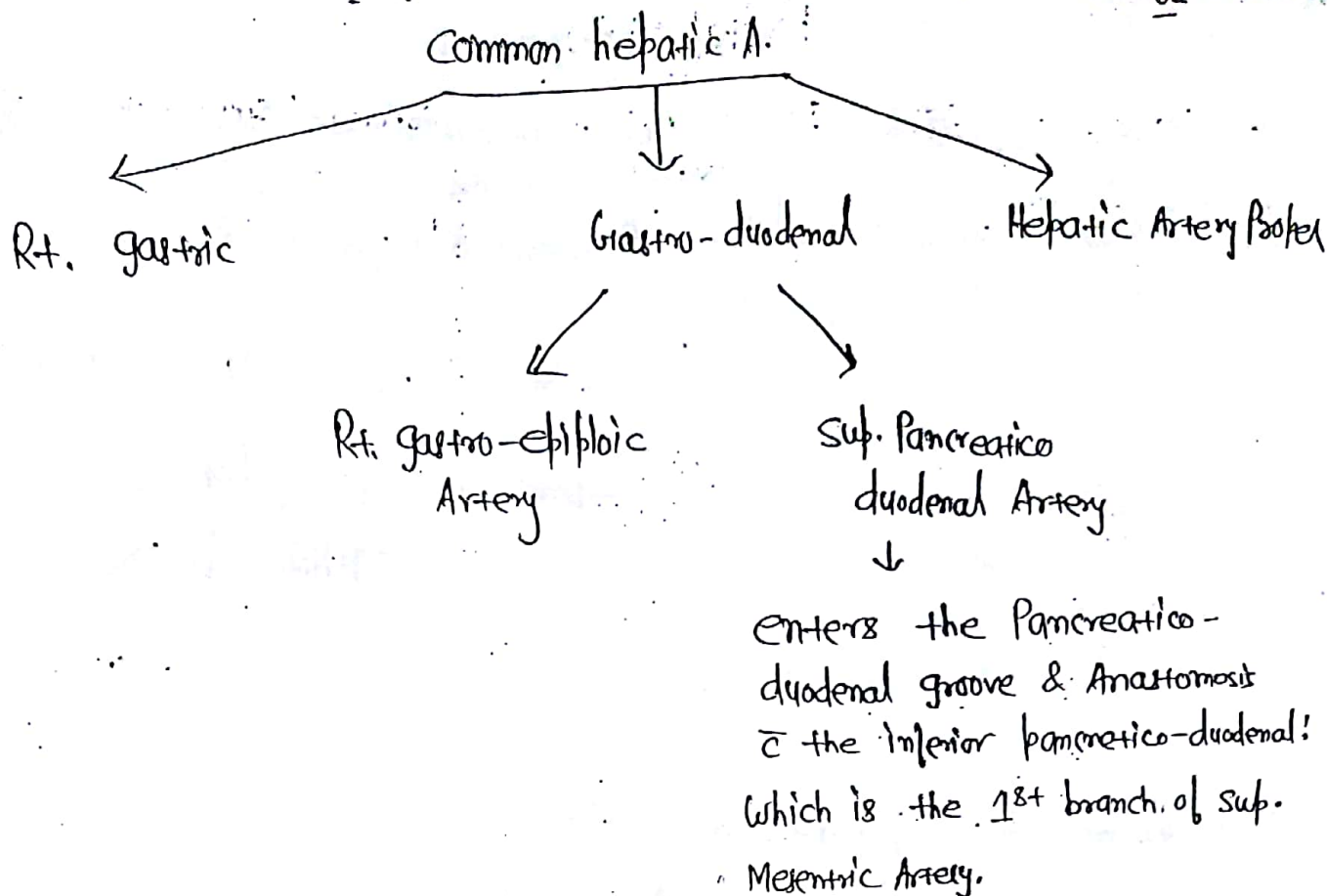
Foregut \Rightarrow extends from Mouth to upper half of 2nd part of duodenum up to the opening of the bile duct
- Also includes Liver, Pancreas & Spleen.

Midgut \Rightarrow extends from Lower half of 2nd part of duodenum to Rti 2/3rd of transverse colon.

Hindgut \Rightarrow extends from Left 1/3rd of transverse colon to Anal canal.



ga "Arteria Pancreatica Magna" \Rightarrow Branch of Splenic A.
ga "Posterior gastric Artery" \Rightarrow Branch of Splenic A.

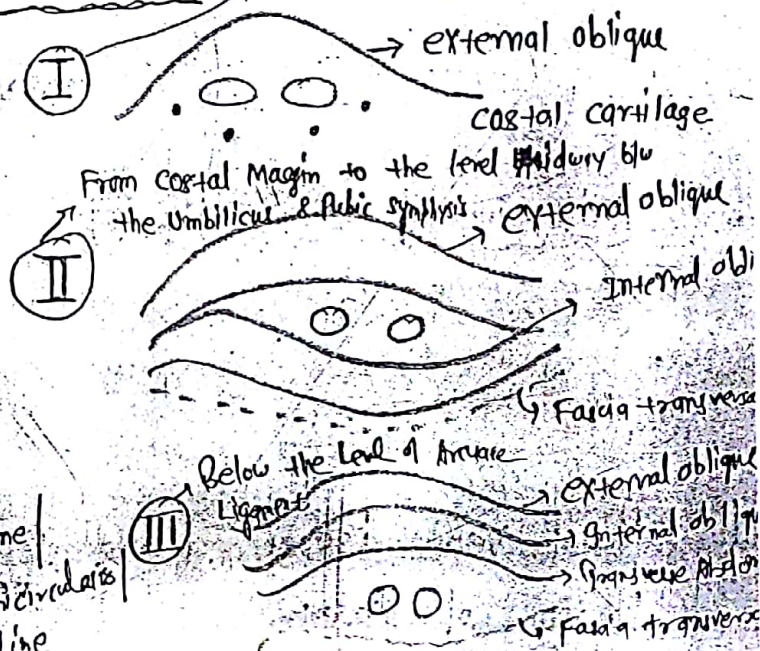
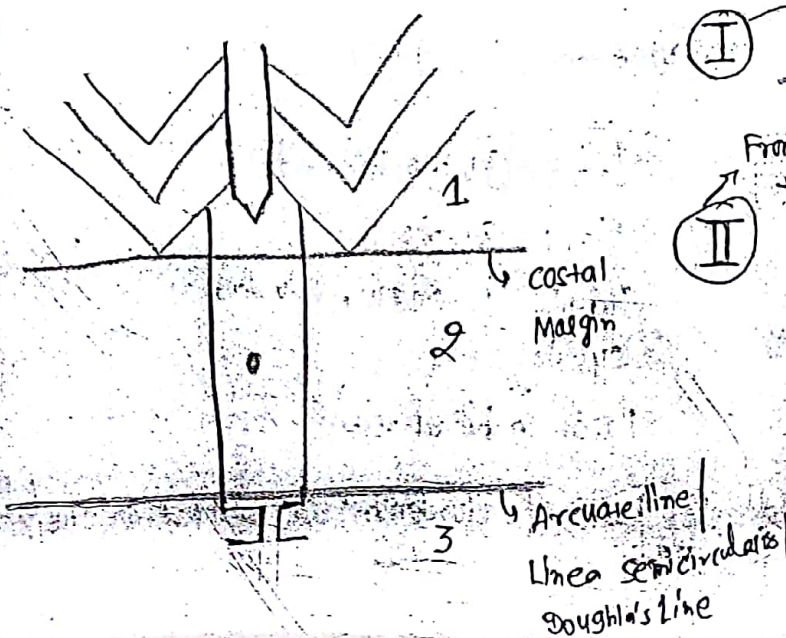


* Griffith's point (Junction of Right 2/3rd & Left 1/3rd of transverse colon)
 ↳ Watershed Line

⇒ Anastomosis b/w Superior Mesenteric Artery (Middle colic) & Inferior Mesenteric Artery (Left colic).

* Sudeck's point → Point (a) Recto-sigmoid Junction; Anastomosis b/w Inferior Mesenteric artery (superior Rectal) & Internal iliac (middle & inf. Rectal Artery).

* RECTUS SHEATH Above the Level of costal Margin



Portal vein

- Length \Rightarrow 8cm & Formed by Union of Superior Mesenteric vein & splenic vein behind the Neck of Pancreas

i) Supra-duodenal part \Rightarrow Anterior & Right \Rightarrow Bile duct

Anterior & Left \Rightarrow Hepatic Artery

Posterior \Rightarrow Ivc separated by
epiolic foramen,

ii) Retro-duodenal part \Rightarrow

Anterior & Right \Rightarrow Bile duct

Anterior & Left \Rightarrow Gastro-duodenal A.

Posterior \Rightarrow gvc

iii) Intra-duodenal part \Rightarrow

Anterior \Rightarrow Neck of the Pancreas

Posterior \Rightarrow gvc

* Tributaries of Portal vein \Rightarrow

Left gastric vein,

Right gastric

Superior pancreatico-duodenal;
cystic

Para-umbilical vein

* Portal vein passes behind 1st part of duodenum; so, divided on the
Location of duodenum.

Bile duct \Rightarrow Formed by Union of cystic & common hepatic duct. ⁹³

Length \Rightarrow 8cm \hookrightarrow Gall bladder \Rightarrow Lies on the Inferior Surface of Liver close related to segment IV or the quadrate lobe

i) Supra-duodenal part \Rightarrow Left \Rightarrow Hepatic Artery
Posterior \Rightarrow Portal vein

ii) Retro-duodenal part \Rightarrow Left \Rightarrow Gastroduodenal A.
Posterior \Rightarrow Gvc

iii) Infra-duodenal part \Rightarrow Anterior \Rightarrow Head of the Pancreas.

Canal of Heister / Intrahepatic bile ductules \Rightarrow Part of outflow system of exocrine bile products from the Liver. ^{NEET 11}

Superior Mesenteric Artery

Branches \Rightarrow Inferior Pancreatico-duodenal A.

Jejunal & ilial branches

Middle colic

Rt. colic

ilio colic

\nearrow Ascending branch

\searrow Descending branch

a) Ant. cecal

b) Post. cecal

c) ⁹³ Appendicular

d) Iliac - supply last part of ilium,

Recurrent appendicular Artery

↳ Branch of Appendicular / Post. cecal Artery

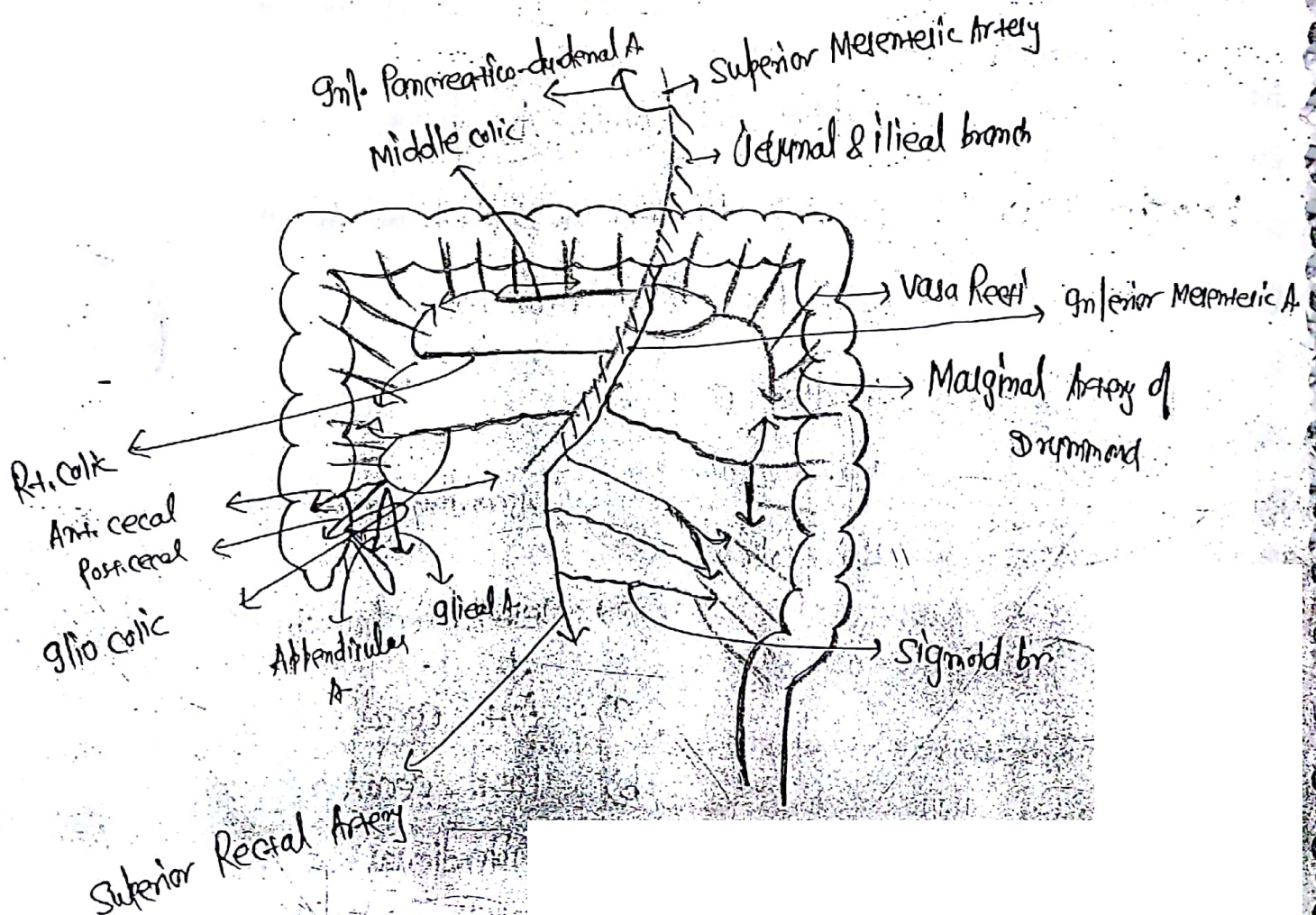
Accessory appendicular Artery of SHESHICALAM

↳ Branch of Post. cecal Artery

* Inferior Mesenteric Artery

Branches

- Left colic
- Sigmoid branches
- Superior Rectal arteries (continuation of Inf. Mesenteric A.)



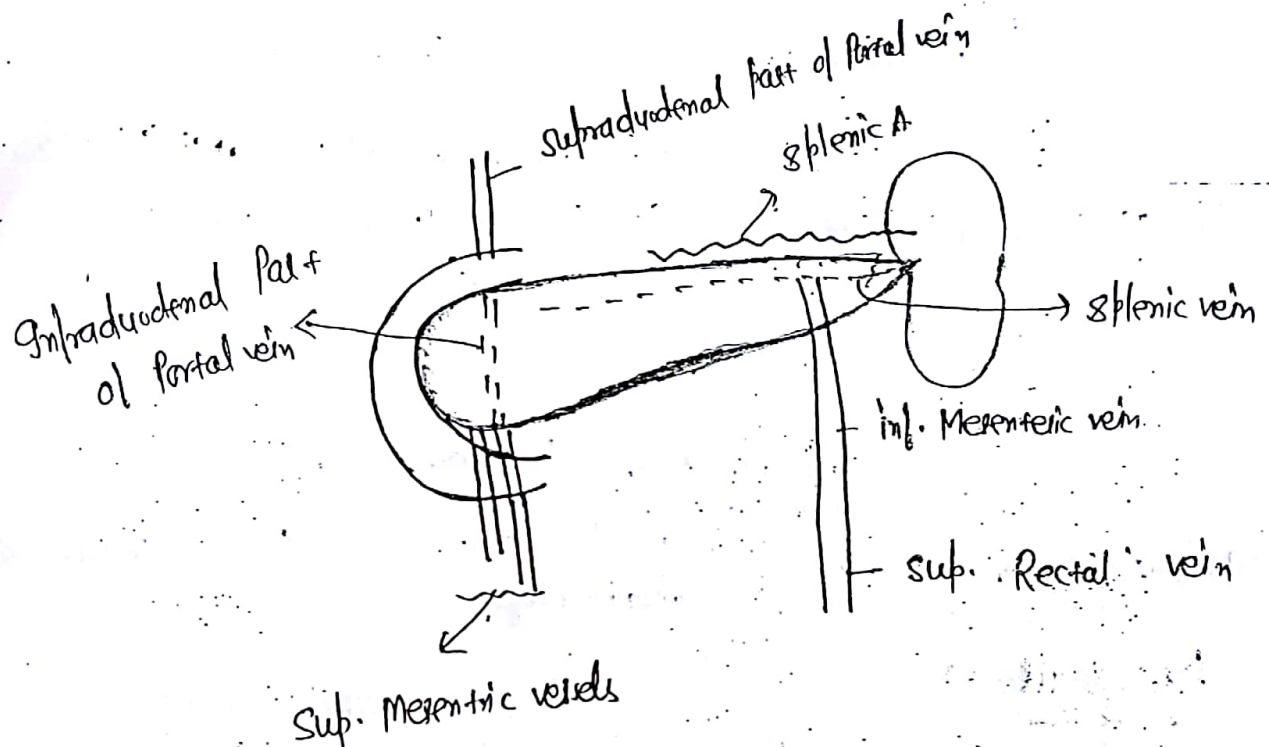
* Blood vessels Related to Pancreas ⇒

Along the Superior border of the body → Splenic Artery

Behind the Body → Splenic vein

On the Uncinate process → Sup. Mesenteric vessels

Behind the Neck of Pancreas → Portal vein



Inferior Vena Cava

— Formed at L₅ by two common iliacs.

— Tributaries ⇒

Common iliacs

Rt. & Lt. Renal

Rt. Suprarenal

Rt. Gonadal

Hepatic veins

Inferior phrenic veins

3rd & 4th Lumbar veins

ANTERIOR ABDOMINAL WALL

- Layers : \Rightarrow
- i> SKM;
 - ii> Superficial fascia: $\begin{cases} \rightarrow \text{Superficial Fatty Layer (Fascia of Camper or Camper's fascia)} \\ \rightarrow \text{Deep Membrane Layer (Fascia of Scarpa or Scarpa's fascia)} \end{cases}$
 \downarrow
 Superficial to Deep fascia
 - iii> External oblique Muscle;
 - iv> Internal oblique Muscle;
 - v> Transversus Abdominis Muscle;
 - vi> Fascia transversalis;
 - vii> Extraperitoneal tissue;
 - viii> Parietal Layer of Peritoneum.

* Deep Fascia is absent in the Anterior Abdominal wall to allow the bulging of abdominal wall after meal; during pregnancy etc

Inguinal Canal (Length = 4-6cm)

Boundaries \Rightarrow extends from deep inguinal Ring to superficial inguinal Ring.

Ant. wall \Rightarrow

In its entire extent \rightarrow External oblique

In its lateral part \rightarrow Internal oblique & transversus abdominis

Post. wall \Rightarrow

In its entire extent \rightarrow Fascia transversalis

In its Medial part \Rightarrow Conjoint tendon

Roof \Rightarrow

Conjoint tendon

Floor \Rightarrow

External oblique & Inguinal Ligament.

AI-13

- Superficial Inguinal Ring \Rightarrow defect in External oblique Aponeurosis,
defect in Fascia transversalis,
- * Deep Inguinal Ring \Rightarrow
- * Conjoint tendon is formed by Fusion of Aponeurotic fibres of Internal oblique & Transversus Abdominis.

Covering of testis

External spermatic Fascia \rightarrow derived from external oblique Aponeurosis,

cremasteric Fascia \Rightarrow derived from cremaster / Internal oblique⁹⁴

Internal Spermatic Fascia \Rightarrow derived from fascia transversalis

Tunica vaginalis \Rightarrow derived from Peritoneum (Mainly Parietal)

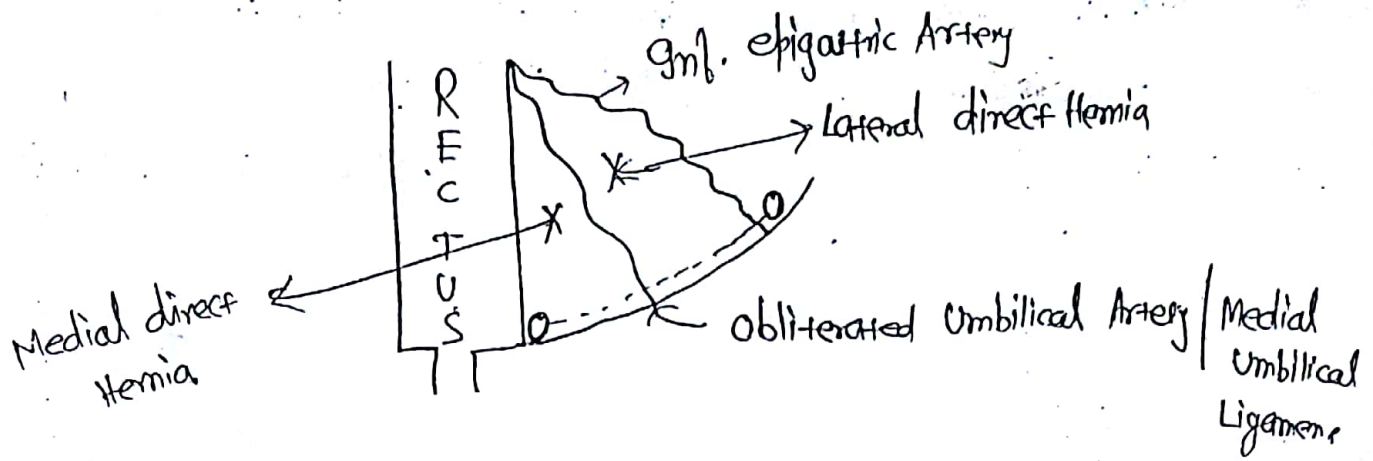
Tunica Albuginea \Rightarrow covering of connective tissue

Tunica vasculosa \Rightarrow covering of Blood vessels

CONTENTS OF SPERMATIC CORD

- Vas deferens (ductus deferens)
- Artery to the vas (Branch of Superior vesical Artery)
- cremasteric Artery — Branch of Anterior epigastric Artery
- Testicular Artery — Branch of Abdominal aorta
- Pampiniform plexus of vein
- Genital br. of Genitofemoral Nerve
- Lymphatics from the testis
- Sympathetic Nerve fibres

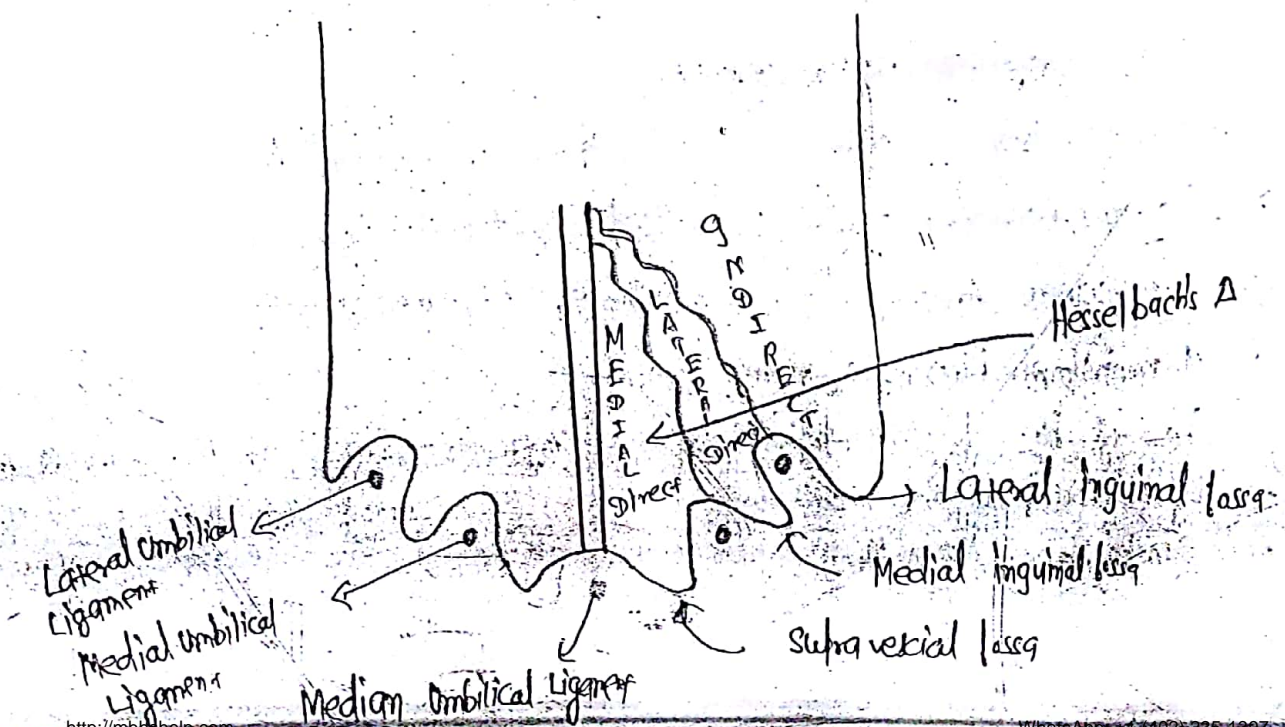
Mnemonic \Rightarrow Pills Don't contribute To
Good sex Life



Medial Umbilical Ligament \Rightarrow Obliterated Urachus | Allantois
 \downarrow
 if it doesn't obliterate
 \rightarrow Weeping Umbilicus

Medial Umbilical Ligament \Rightarrow Obliterated Umbilical Artery

Lateral Umbilical Ligament \Rightarrow It is fold of Peritoneum; which covers inferior epigastric vessels.



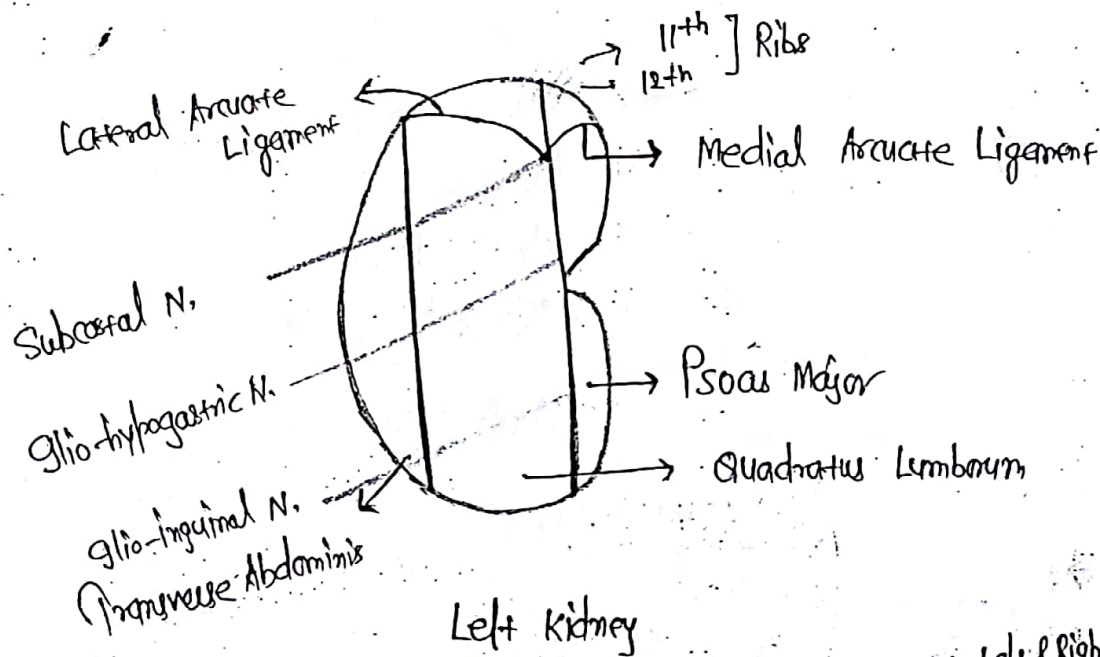
* Hesselbach's Δ \rightarrow Medial Border \rightarrow Lateral Margin of Rectus sheath
(Linea Semilunaris);

Superolateral Border \rightarrow Inferior epigastric vessels.

Inferior Border \rightarrow Inguinal Ligament (Poupart's Ligament).

KIDNEY

Posterior Relations of kidney \Rightarrow of both kidney are same except Rt. kidney is related to only 12th Rib; while Lt. kidney related to both 11th & 12th Ribs.



- \rightarrow both Left & Right
- * venous drainage of kidney \Rightarrow • Renal veins drain into IVC;
 - Left Renal vein is longer & passes in front of Abdominal Aorta; behind origin of Superior Mesenteric Artery.
 - Left Renal vein also receives Lt. inferior phrenic vein, Lt. gonadal vein & Lt. suprarenal (Adrenal gland);
 - Each Renal vein begins beneath the true capsule as "stellate vein".

* Anterior Relation of ⇒ (A) Right Kidney ⇒

- Rt. Supra Renal gland
- Liver
- 2nd part of duodenum
- Ascending colon
- Hepatic flexure of the colon
- Small Intestine

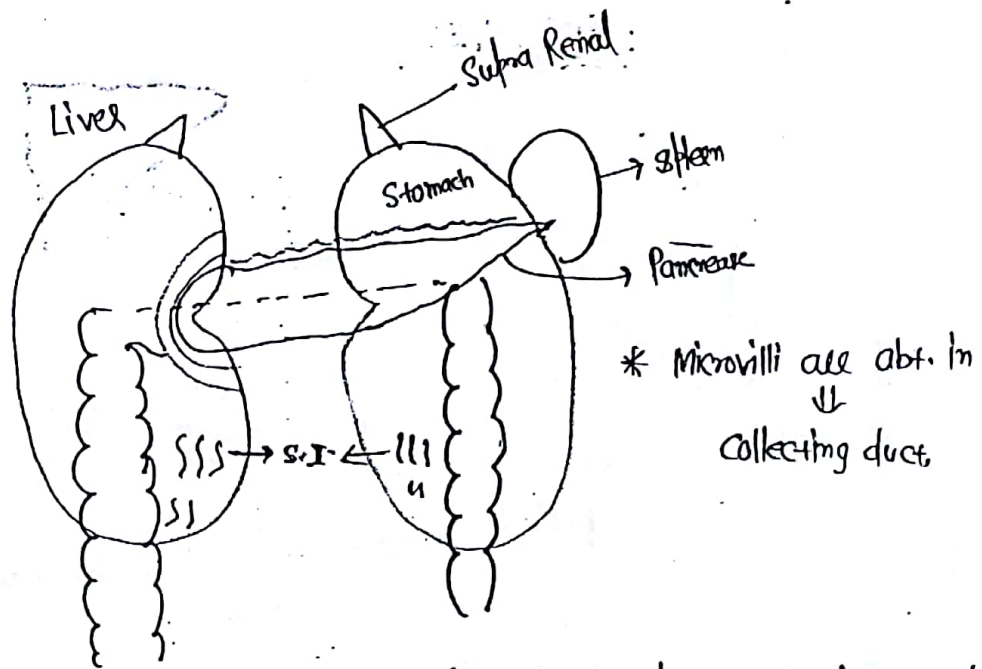
(B) Left Kidney ⇒

- Lt. Supra Renal gland
- Stomach
- Spleen
- Splenic Artery
- Pancreas
- Splenic flexure
- Descending colon
- Small Intestine

STOMACH BED

Formed by ⇒

- Lt. Supra Renal
- Lt. Kidney
- Spleen
- Splenic Artery
- Pancreas
- Transverse colon
- Left side of diaphragm



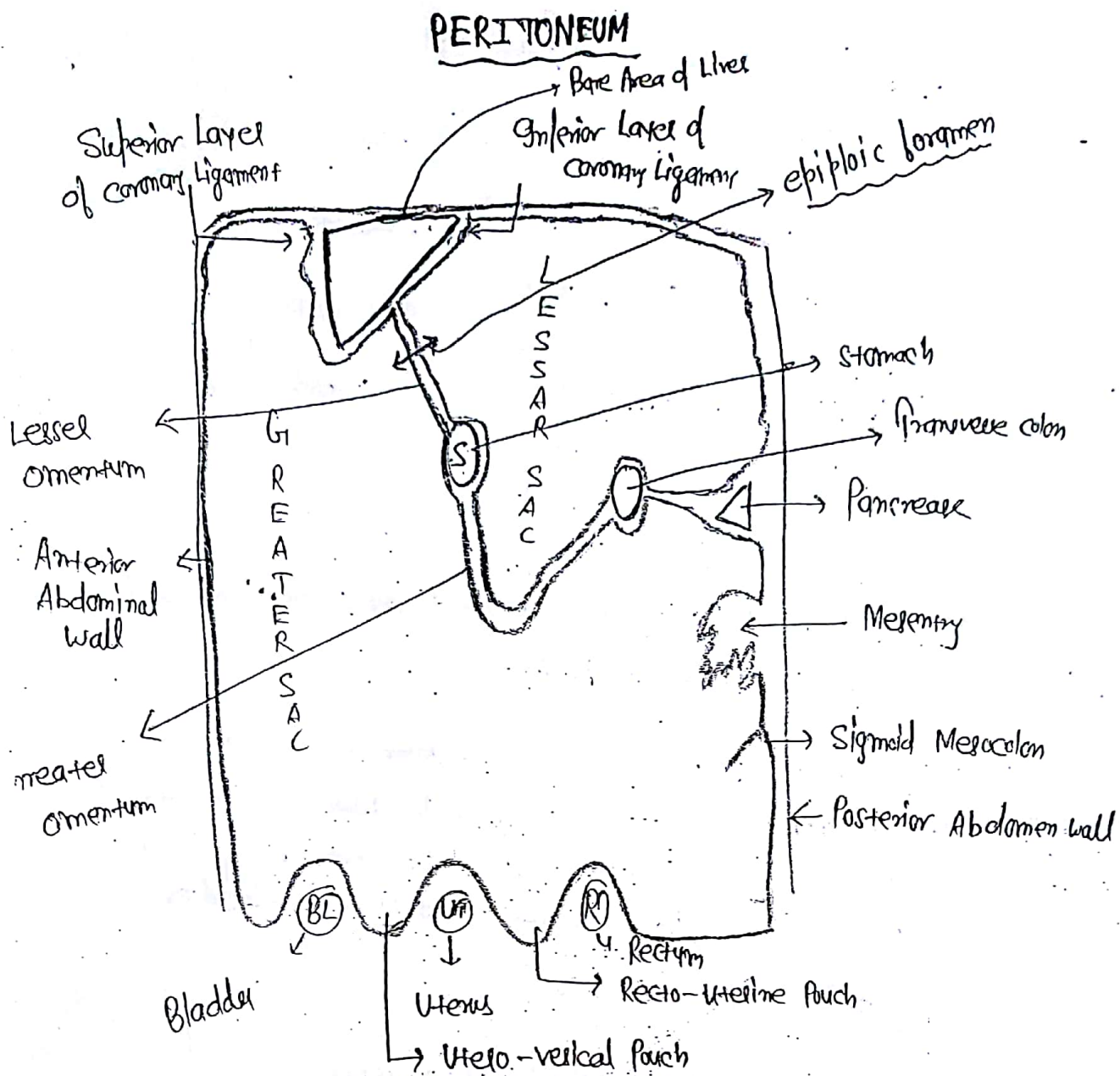
* QQ (NEET 16) ...
DUCTS OF BELLINI \Rightarrow Papillary (collecting) ducts are Anatomical structures of kidney; K/a "DUCTS OF BELLINI".

QQ (NEET 16) * CAUDATE LOBE OF LIVER \Rightarrow Anatomically situated on posterior surface of Right lobe.
 - It belongs physiologically to both Right & Left lobes b/c it receives blood from Right & Left hepatic arteries; Right & Left branches of Portal vein & drains bile into both Right & Left hepatic duct. Thus it is considered as "physiological independent lobe".
 \rightarrow "Segment I"

* SPACE OF DISSE \Rightarrow K/a "Perisinusoidal space".

- Space b/w Hepatocytes & Hepatic sinusoids.
- Exchange of substance b/w hepatocytes & blood takes place in the space of Disse.
- Microvilli of hepatocytes extend into this space; net surface area for Absorption.
- Major constituents of space of Disse \Rightarrow Blood plasma.

* RENAL VASCULATURE \Rightarrow Each kidney is supplied by Renal Artery (branch of Abdominal Aorta) & is drained by Renal vein to IVC;
 • Rt. Renal Artery is longer & passes behind IVC;
 • Renal Artery divides into \rightarrow (A) Posterior division \Rightarrow Supplies Posterior segment.
 (B) Anterior division \Rightarrow 4 branches \rightarrow Apical; Upper Anterior; Middle Anterior & Lower.
 • Branches of Renal artery are end arteries.



Retroperitoneal organs ⇒

- ① Kidneys
- ② Supra-Renal
- ③ duodenum except a small area of the 1st & 4th part.
- ④ Pancreas
- ⑤ Ascending & Descending Colon
- ⑥ Aorta & IVC
- ⑦ Ureters

→ Set of tissue, which is formed by the double fold of Peritoneum, that attaches the Intestine to the wall of Abdomen.

→ duodeno-jejunum flexor.

Root of Mesentery ⇒ extends from D-J flexor (Left transverse process of L₂) to Right Saco-iliac joint.

- Structures crossing by the Root of Mesentery ⇒

- 3rd Part of duodenum
- Aorta
- GVC
- R+ Psoas Major
- R+ Ureter.

↳ K/las "Foramen of Winslow" ⇒ Passage b/w greater sac & lesser sac

Epiploic foramen (Boundaries)

Anteriorly ⇒ Lesser omentum containing hepatic artery; Portal v & Bile duct.

Posteriorly ⇒ IVC
R+ Suprarenal gland
Body of T₁₂ vertebrae

Superiorly ⇒ Caudate lobe of Liver (caudate process)

Inferiorly ⇒ 1st part of duodenum

* Length of epiploic foramen ⇒ 4-6 cm

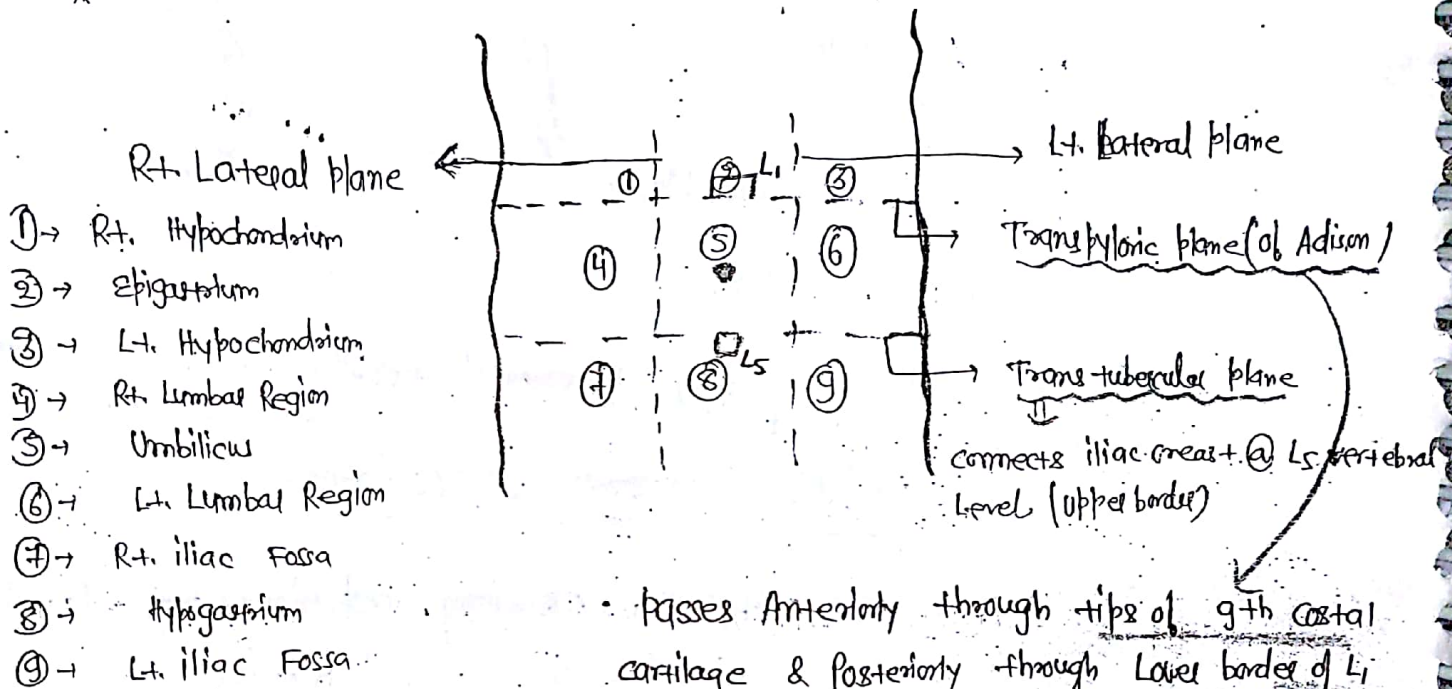
NEET '16

⇒ A Posterior gastric ulcer May perforate into the Lesser Sac (omental bursa). The leaking fluid passes out through epiploic foramen to reach hepatorenal pouch.



Sometimes, in these cases the epiploic foramen is closed by Adhesion; so, the lesser sac become distended & can be drained by a tube passed through Lesser omentum,

*



• Passes Anteriorly through tips of 9th costal cartilage & Posteriorly through Lower border of L₁ vertebrae.

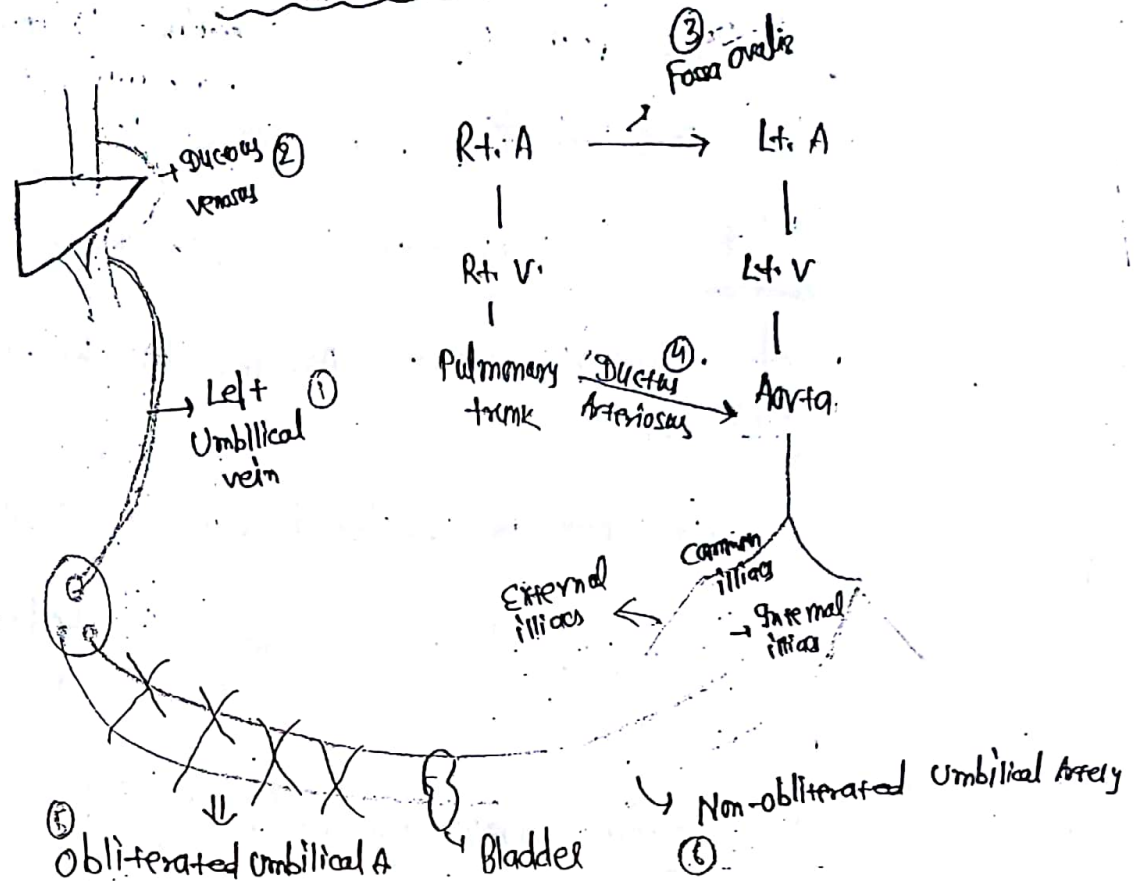
• Organs @ this level ⇒ Hilum of kidney; Pylorus of stomach; Beginning of duodenum; Neck of Pancreas; Fundus of Gall bladder & origin of Superior Mesenteric vessel.

* Renal Angle ⇒ Angle b/w Last Rib & outer border of erector spinae.

* Umbilicus ⇒ Lies b/w L₃ & L₄ vertebrae.
Highest point of iliac crest lies @ L₄ vertebrae. The supracristal plane is indicated by a horizontal line through the highest points of iliac crest.

* Umbilicus is watershed; Lymph flows upwards to drain into Axillary Lymph Nodes; Below the level of Umbilicus lymph flows downwards to drain into Superficial inguinal Lymph Node.

FETAL CIRCULATION



* Uterine A. & ovarian A. together form Arcuate Artery Anastomosis; which then give off the Radial arteries & finally branches into basal & spiral Arteries

Uterine Artery → Arcuate artery → Radial Artery → spiral Artery

- ① Obliterated Left Umbilical vein ⇒ Ligamentum teres
- ② Ductus Venosus ⇒ Ligamentum venosum
- ③ Foramen ovale ⇒ Fossa ovalis
- ④ Ductus Arteriosus ⇒ Ligamentum arteriosum
- ⑤ Obliterated Umbilical Artery / distal part of Umbilical Artery ⇒ Medial Umbilical Ligament
- ⑥ Non-obligated part of Umbilical Artery / Proximal part of Umbilical Artery ⇒ Superior vesical Artery

DEVELOPMENT OF STOMACH

- develops from Foregut
 - It has Rt. & Lt. Surface; Ant. & Post. borders
- Length = 10 inches
At birth capacity = 30ml; Adults 1500-2000ml

i) 1st Rotation Along vertical Axis \Rightarrow

Left Surface becomes Anterior & the Right becomes Posterior

- The Anterior border becomes \rightarrow Right
- Posterior border becomes \rightarrow Left

ii) 2nd Rotation Along Antero-posterior axis \Rightarrow

Pylorus comes to lie @ a higher level

- The left border grows rapidly to form greater sac
- during Rotation the dorsal Mesogastrium also turns to the left; thus forming lesser sac

* Derivatives of ventral Mesogastrium \Rightarrow

i) Falciform Ligament $\xrightarrow{\text{contains}}$ Ligamentum teres & Paraumbilical vein

ii) Lesser omentum

iii) Superior & Inferior layers of coronary Ligament

iv) Rt. & left triangular Ligaments

* The Main Support of Liver is \Rightarrow Hepatic vein draining into gvc

* Derivatives of Dorsal Mesogastrium \Rightarrow

i) Gastro-splenic Ligament \Rightarrow Contains short gastric vessels & Left gastroepiploic vessels

ii) LinoRenal Ligament \Rightarrow Contains splenic vessels & tail of the pancreas

iii) Greater Omentum

iv) Gastro-phrenic Ligament

* Blood Supply of Stomach \Rightarrow

Along the Lesser curvature \rightarrow Lt. & Rt. gastric Arteries;

Along the Greater curvature \rightarrow Lt. & Rt. gastro-epiploic arteries;

Fundus \rightarrow Short gastric Arteries

* Venous drainage \Rightarrow

Lt. & Rt. gastric veins \rightarrow drains into the portal vein;

Lt. gastro-epiploic & short gastric veins \rightarrow drains into splenic vein;

Rt. gastro-epiploic vein \rightarrow drains into Superior Mesenteric vein,

NEET 16

\rightarrow The prepyloric vein of Mayo is a tributary of the Rt. gastric vein & is the external landmark of Gastroduodenal Junction.

Development of Pancreas

Dorsal Pancreatic bud forms → Upper part of head; Neck & tail of the Pancreas

Ventral Pancreatic bud forms → Lower part of head & Uncinate process

Annular Pancreas is due to defective migration of Ventral Pancreatic bud.

Non-fusion of two buds Result in ⇒ Pancreatic division
↓ ↓
Dorsal & ventral buds. M/c congenital Anomaly of Pancreas

Main Pancreatic duct / Duct of Wirsung ⇒

- derived from the duct of dorsal bud; ventral bud & the anastomosis b/w them.
- opens @ Major duodenal papillae; 8 to 10 cm from the pylorus

Accessory Pancreatic duct / Duct of Santorini ⇒

- formed from duct of dorsal bud
- opens @ Minor duodenal papillae; 6 to 8 cm from the pylorus

Accessory Pancreatic tissue May be found in ⇒

- Wall of Stomach; Duodenum; Jejunum or Ileum
- Meckel's diverticulum.

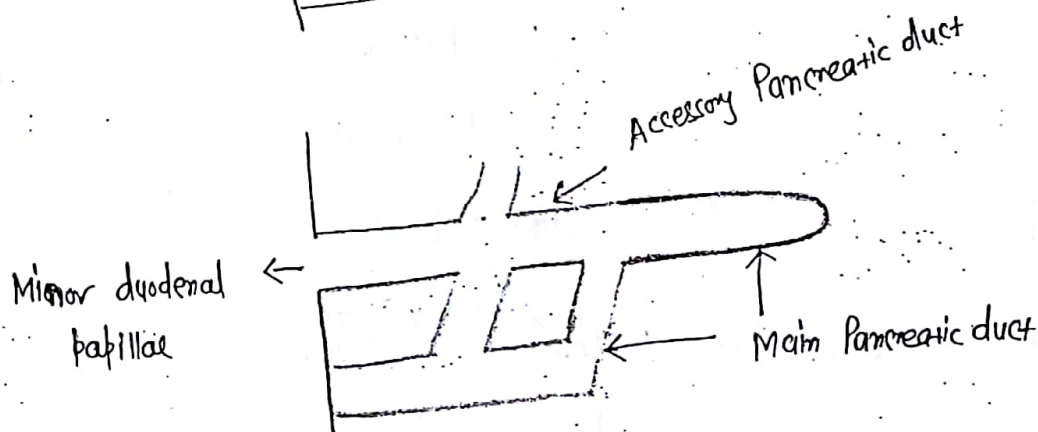
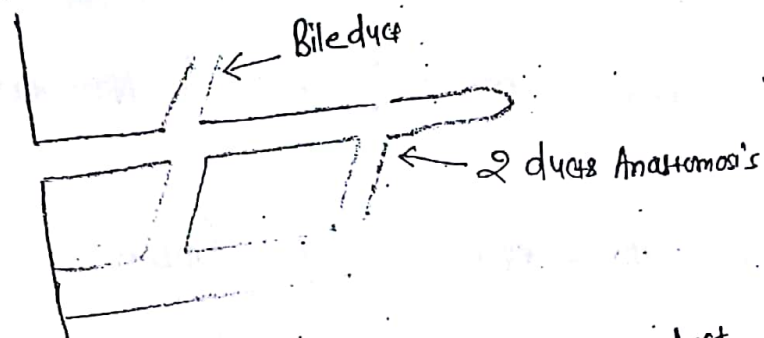
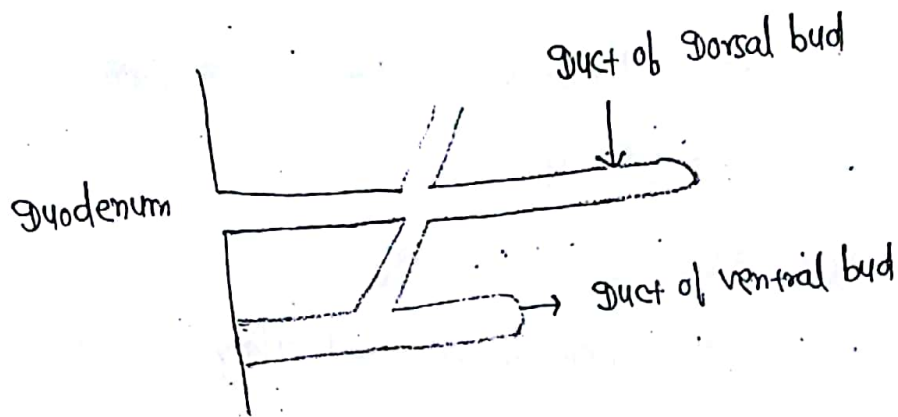


Fig: Development of Pancreatic duct

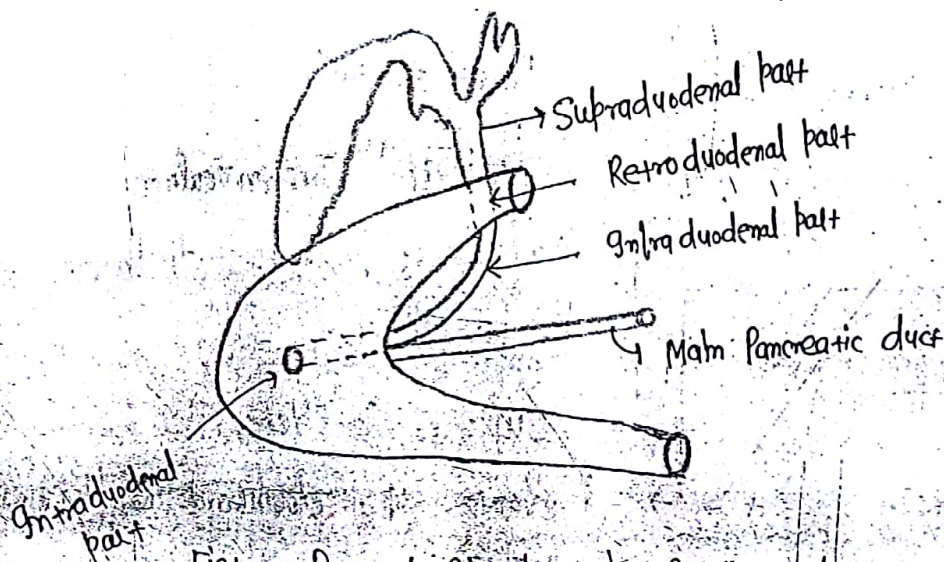


Fig: Part of Bile duct in Relation to diaphragm

SPLEEN (1, 3, 5, 7, 9, 11, 10)

- 1 x 3 x 5 — dimension of spleen (in inches)
- 7 ounces of wt (250 gm)
- ⊕nt b/w the 9th & 11th Ribs
- Long axis of the spleen is directed along 10th Rib
- Spleen Makes an angle of 45° w the H₂ plane
- It projects into the Greater Sac
- ∴ Superior border of spleen is Notched.

*

Impression on spleen

- a) Gastric
- b) Renal
- c) Pancreatic
- d) colic
- e) Diaphragmatic

*

Ligaments of spleen

- a) Gastro-splenic
- b) Lieno-Renal
- c) Phrenico-colic
 - ↳ Known as "Sustentaculum Lienis".
 - ↳ extends from the diaphragm to splenic flexure of colon
 - ↳ Supports the spleen
 - ↳ prevents the downward displacement of spleen.

Qa

Accessory spleen can be found in →

Hilum

Tail of Pancreas

Derivatives of dorsal Mesogastrium

Broad Ligament of Uterus

Spermatic cord

* PALS (Periarteriolar Lymphoid sheath) is a histological feature of \Rightarrow white pul of the spleen

ROTATION OF GUT

The pre-arterial segment lies — Superiorly
Post-arterial segment lies — Anteriorly

i) 1st Rotation (90°) \Rightarrow

the pre-arterial segment lies on Rti side

— it forms the Small intestine

— as it Returns back to the Abdominal cavity, 2nd Rotation occurs

ii) 2nd Rotation (90°) \Rightarrow

the post-arterial segment lies superiorly

\rightarrow caecum lies in the midline

As it Returns back \rightarrow 2nd Rotation occurs

iii) 3rd Rotation $\rightarrow 90^\circ$

Cecum lies on R+ side - Subhepatic cecum

* Herniation of midgut loop occurs by \Rightarrow 6 weeks

* Herniation of midgut loop Reduced by \Rightarrow 10 weeks

* MALROTATIONS \Rightarrow

1. Mixed Rotation \Rightarrow The pre-arterial segments alone rotates by 90° .

- The Post arterial segment rotates by 180°

QQ cecum lies in the midline behind the stomach.

2. Non-Rotation \Rightarrow 1st Rotation is Normal.

- Further Rotation doesn't occur

- cecum lies on Left side

- Left sided colon

3. Reverse Rotation \Rightarrow 1st Rotation is Normal

- 2nd Rotation occurs by 180° in the Reverse direction

- Transverse colon lies behind small intestine

HIND-GUT (Urachus Fistula \Rightarrow Patent Allantois)

Part of the hind-gut below the attachment of Allantois
 \downarrow
Cloaca

The Uro-Rectal septum divides the cloaca into

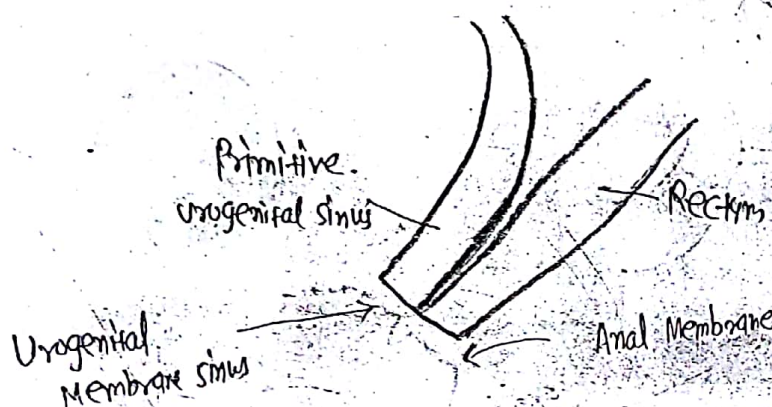
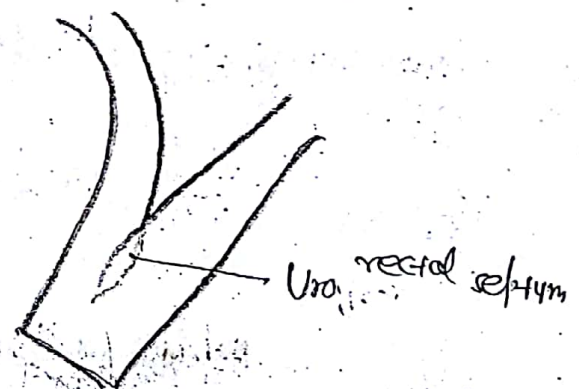
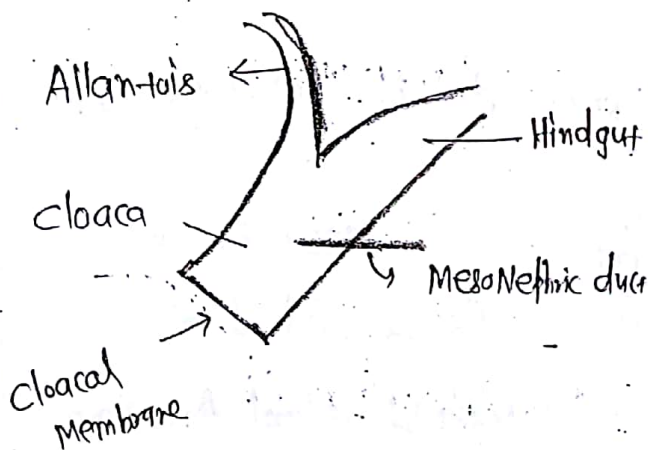
Urogenital sinus
Anteriorly

Rectum & Anal canal
Posteriorly

The cloacal Membrane divides into

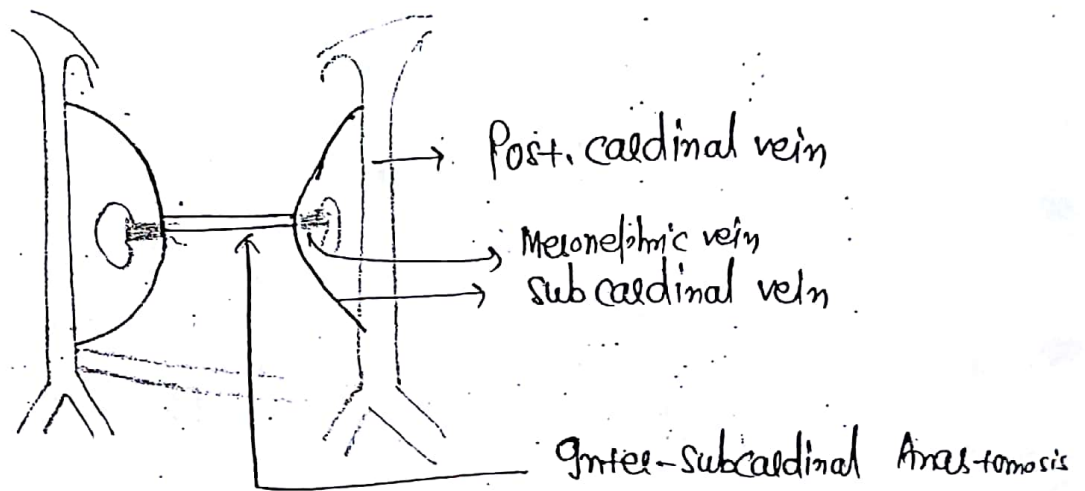
Urogenital Membrane
Anteriorly

Anal Membrane
Posteriorly



* Blood supply of supra-renal gland !⇒

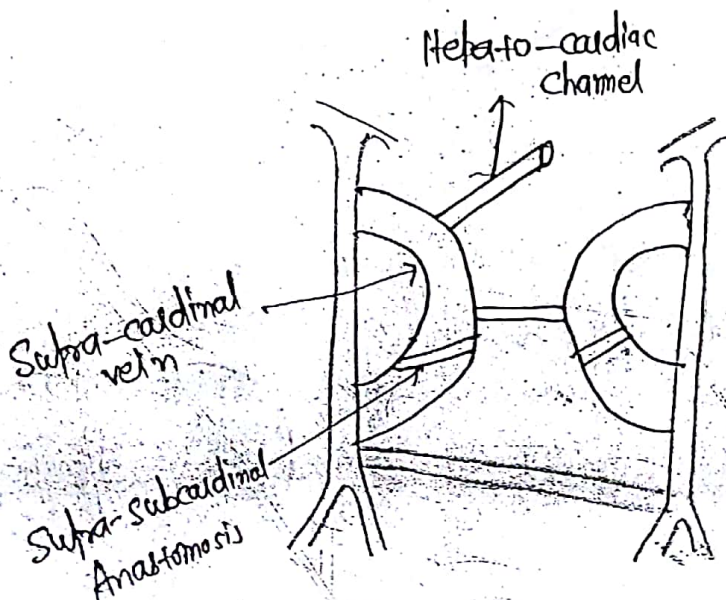
- ① Superior supra-renal Artery → Branch of Inferior phrenic Artery
- ② Middle supra-renal Artery → Branch of Abdominal Aorta
- ③ Inferior supra-renal Artery → Branch of Renal Artery



Rt. Renal vein ⇒ derived from Rt. Mesonephric vein

Lt. Renal vein ⇒ derived from - Lt. Mesonephric vein
Lt. Subcardinal vein

Intersubcardinal Anastomosis



*

Clinical sign of different Porto-systemic circulation : \Rightarrow

esophageal varices (Bleeding)

Hemorrhoids

Caput Medusae

PORTAL HYPERTENSION

NEET '16

1. TEMPORARY MUCOSAL FOLDS : \Rightarrow Mucosal fold; which are obliterated by distension.

Eg \Rightarrow Gastric Rugae of stomach & Longitudinal fold.

2. PERMANENT MUCOSAL FOLDS : \Rightarrow eg \Rightarrow plica circulares (valves of Kerck of small intestine;

• Crescentic Mucosal folds of cystic duct (spiral valve of Heister)

• Transverse (Horizontal) Rectal folds (Houston's valve or plica transversalis);

• Permanent Longitudinal Rectal columns or folds (Found in Lower Rectum. Anal canal).

PETIT TRIANGLE (Inferior Lumbar triangle)

NEET '16

Boundaries : \Rightarrow Base \Rightarrow Iliac crest.

Anterior Boundary (Abdominal Boundary) \Rightarrow Posterior border of External oblique Mu

Posterior Boundary (Lumbar Boundary) \Rightarrow Anterior border of Latissimus dorsi

Floor \Rightarrow Internal oblique Muscle

PELVIS

* Structures winding Around sacral spine →

P → Pudendal Nerve

I → Internal Pudendal vessels

N → N. to Obturator Internus

they leave the pelvis through Greater sciatic foramen and enter the perineum through Lesser sciatic foramen.

- The tendon of obturator Internus emerges out through lesser sciatic foramen.

* Blood supply of Pelvis ⇒

- Internal iliac Artery - Small terminal branch of common iliac A.

Anterior division

Posterior division

- Superior Vesical Artery
- Inferior vesical Artery (Supplies the prostate)
- Middle Rectal Artery
- Obturator Artery
- Uterine & Vaginal Artery
- Superior gluteal Artery
- Internal Pudendal Artery

- Superior gluteal Artery
- Lateral Sacral Artery
- Ilio-Lumbar Artery

It supplies L vertebrae

While Accessory (Aberrant) obturator Artery is the branch of Inferior epigastric Artery

It is the branch of external iliac Artery

Inferior epigastric A. Femoral A. Deep circumflex iliac A.

In female it is replaced by "Uterine & Vaginal Artery".

URETER

- Length \Rightarrow 25 cm (10 inches)
- completely Retroperitoneal organ.

Abdominal Part -

Post. Relation \rightarrow Transverse process of Lumbar process;
Psoas Major
Genito-femoral Nerve

Ant. Relation of Right Ureter \rightarrow 3rd Part of duodenum

- R+ colic vessels
- Ilio-colic vessels
- Root of Mesentery
- Gonadal vessels
- Terminal part of ileum

Ant. Relation of Left Ureter \rightarrow Left colic vessels

Sigmoid vessels
Sigmoid Mesocolon
Gonadal vessels

Pelvic part - Goes backwards along greater Sciatic Notch also internal iliac vessels behind it.

- turns anteriorly at ischial spine & enters the subolateral angle of Trigone of bladder

- In Males; the ureter is crossed by vas deferens

- In Females; the ureter is crossed by uterine artery

Blood Supply of Ureter \Rightarrow

- ① At its beginning \rightarrow Renal Artery;
- ② Below it \rightarrow Abdominal Aorta;
- ③ Little below it \rightarrow Gonadal Artery;
- ④ At the Pelvic inlet \rightarrow Internal iliac / common iliac
- ⑤ Near the base of bladder \rightarrow
 - Superior vesical
 - Inferior vesical
 - Middle Rectal

Constriction of Ureter \Rightarrow Diameter = 3mm

- ① Pelvi-ureteric junction
- ② Crossing of the pelvic brim / bifurcation of common iliac / crossing of external iliac
- ③ Crossing by the ductus deference / Broad Ligament
- ④ Entry into the bladder (Narrowest part of Ureter)
 \rightarrow K/as "vesicoureteric junction"
- ⑤ Opening into the Trigone

URINARY BLADDER

Q8

Retropubic space of Retzius:

\hookrightarrow Lies behind the Pubic symphysis
 \Downarrow
contains vesicle venous plexus

- * except \rightarrow Trigone; Rest all are derived from "Vesicourethral canal" (endodermal)
- * 1st desire of Micturition usually appears @ 150-250 ml filling

OVARY

- Suspended from posterior leaflet of broad Ligament by Mesovarium
- Attached to cornu of the uterus by Ligament of ovary and Lateral pelvic wall by Suspensory Ligament of ovary / Infundibulo-pelvic Ligament.
- drains into the para-aortic Lymph Nodes.

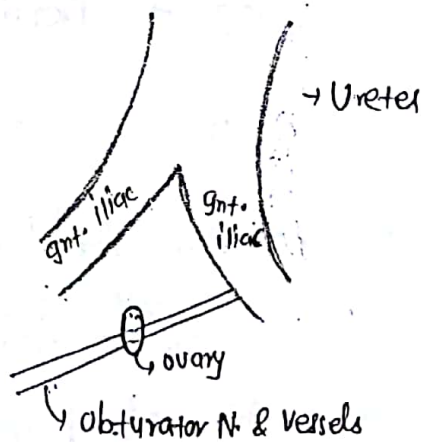
OVARIAN FOSSA

Boundaries →

Superiorly → external iliac vessels

Posteriorly → Ureter & internal iliac vessels

Laterally & the floor → Obturator Nerve & vessels



UTERUS

Body

CERVIX (2.5 cm Long)

Round Ligament of Uterus is attached to →
i) CORNU;
ii) Labia Majora

* Base of the bladder !→

In Males →

- Separated from the Rectum in the upper part is by Recto-vesicle pouch
- Related to vas deferens, Ampulla of vas, Seminal vesicle & ejaculatory duct.

In Females - Related to supra-vaginal part of the cervix & vagina

Fascia of Denonvilliers → extends from Rectovesicle pouch to the perineal body

↳ Separates the Rectum from Seminal vesicle & prostate in Males

* N. Supply !→ Sympathetic !→ T₁₀ - L₂
↳ Contracts the sphincter & Relaxes the Muscle

Parasympathetic !→ S_{2,3,4}

↳ Contracts the Muscles & Relaxes the sphincter

* epithelium of Bladder Mucosa !→ Transitional

URETHRA

Male urethra on section → At bulb → Trapezium

In the Penis → Horizontal slit

At base of glans → Inverted "T" shape

At external urethral orifice → vertical slit

Epithelial Lining

→ Above the opening of ejaculatory duct → Transitional

↳ Middle of gland

→ Columnar

Lymphatic drainage of Uterus \Rightarrow

Fundus & Upper part \rightarrow Para-aortic Lymph Node

Middle Part \rightarrow external iliac Lymph Node

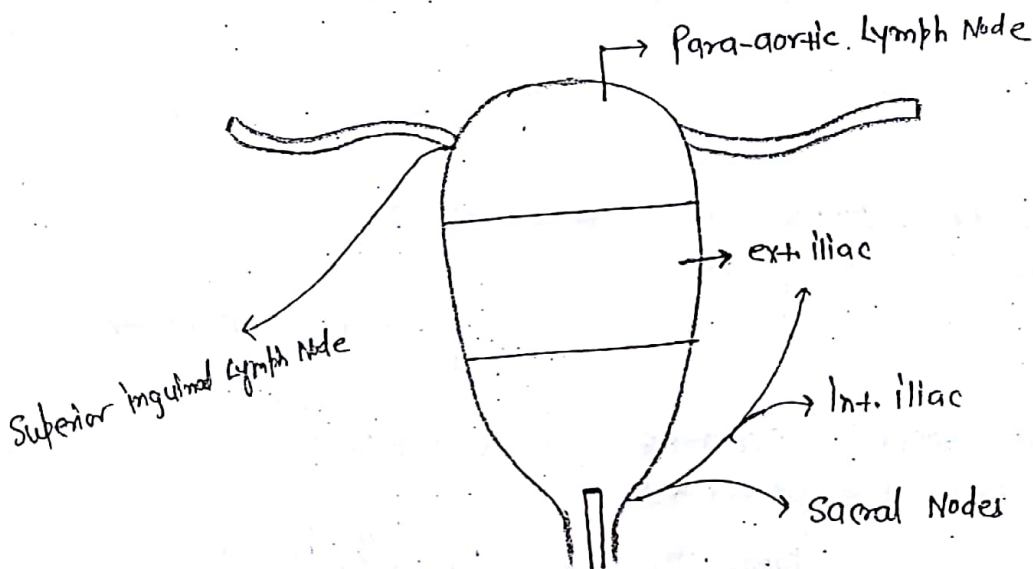
Lower Part \rightarrow In all direction

Anteriorly \Rightarrow external iliac L.N.

Laterally \Rightarrow Internal iliac L.N.

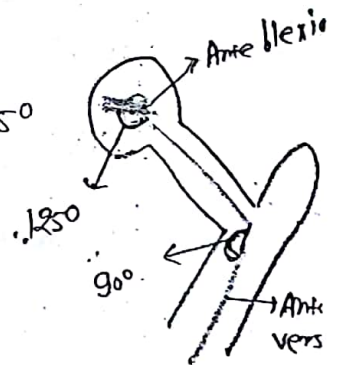
Posteriorly \Rightarrow Sacral L.N.

Cornu \rightarrow Superficial Inguinal Lymph Node.



* Uterus \bar{c} vagina $\Rightarrow 90^\circ$;
 \Downarrow
Anteversion

Uterus \bar{c} cervix $\Rightarrow 125^\circ$
 \Downarrow
Anteflexion

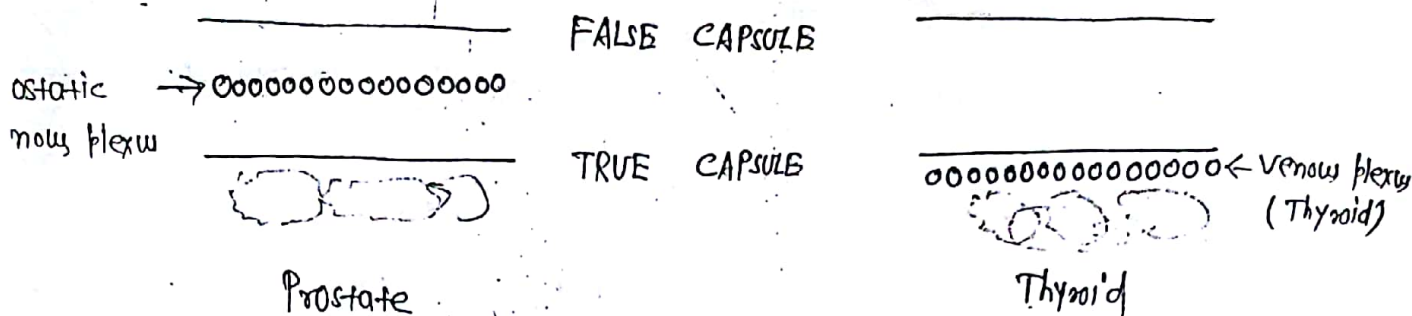


* Uterine cavity \Rightarrow Lined by ciliated columnal epithelium;
cervical canal \Rightarrow Lined by Non-ciliated simple columnal epithelium;

* Nerve Supply \rightarrow Sympathetic \rightarrow From T₁₂; L₁ segments & carry painful sensation from the body of Uterus.

Parasympathetic \rightarrow From S_{2,3,4} & carry painful sensation from cervix.

PROSTATE



- Prostatic venous plexus communicates \bar{c} \Rightarrow vertebral venous plexus
 \downarrow
 Dorsal vein of penis

- this further communicates \bar{c} vertebral venous plexus
 \downarrow valveless communication

\Rightarrow through it the prostatic carcinoma \leftarrow Batson's plexus
 can spread to vertebral column & skull

- Medial Lobe is More prone to hypertrophy (BPH)
- Posterior lobe is More prone to Cancerous changes (Prostatic cancer)
- Anterior lobe \rightarrow Devoid of glandular tissue hence Adenoma seldom occurs.

* Prostate \Rightarrow is also klas "Fibro-Muscular-glandular organ".

4 Surfaces

Anterior

Posterior

2 Inferolateral

Peripheral Zone \Rightarrow Posterior Lobe
Central Zone \Rightarrow Median Lobe

\downarrow
 lies behind Pubic Symphysis;
 Separated from it by extra-
 peritoneal fat in Retropubic
 space (Cave of Retzius)

- Separated by
 Fascia of Denonvilliers
 from Rectum
 - Palpated on P/R examination

PROSTATIC URETHRA

- Shows an elevation in Midline \Rightarrow Urethral crest



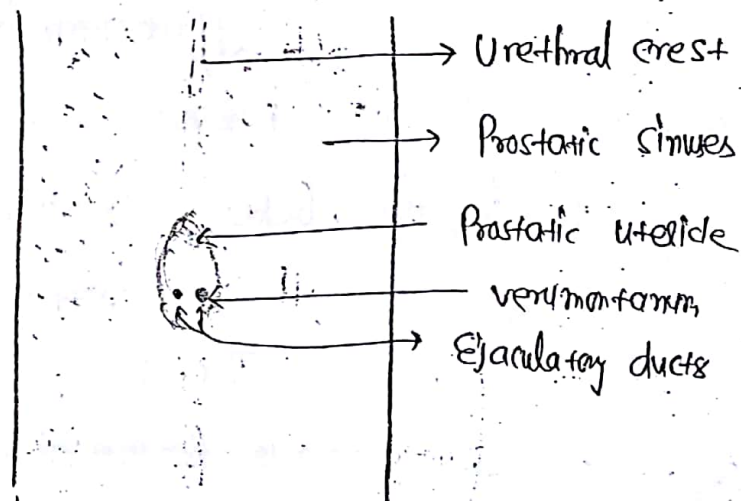
Form d/t continuation of Trigonal Muscle
the bladder.

- Another elevation in the Middle of Urethral crest



VERUMONTANUM | COLLICULUS SEMINALIS

- Opening of Prostatic utricle in the centre and ejaculatory duct on the either side of verumontanum
- Opening of Prostatic gland / Prostatic Sinuses along Posterior wall



Fig! Prostatic Urethra \Rightarrow Ant @ the Junction of Ant. 1/3 & Post. 2/3rd of gland.

* Corpora Amylacea (Amyloid bodies) \rightarrow Prostate

* Corpora Arenacea \rightarrow Pineal gland

RECTUM

Length — 12 cm

Sacculations; Appendes epiploicae & Taenia coli are absent.

↳ Characteristics of Large Intestine

* Horizontal folds / Plica transversalis ⇒

1st → R+ wall → 12-14 cm Above Anal canal

2nd → L+ wall → 7-5 cm Above Anus

3rd → (valve of Houston)

Anterior & Right wall → At the upper end of Rectal

Ampulla; Above Anus

* Development of Rectum ⇒

Part of Rectum Above the hausten valve

↓ developed from

Foregut

Part of Rectum below the hausten valve

↓ developed from

Cloaca

* Waldeyer's Fascia ⇒ Connects Rectum to Sacrum.

* B. Supply of Rectum ⇒ a) Superior Rectal Artery (Major supply) ⇒ Continuation of Inferior Mesenteric Artery.

b) Middle Rectal Artery ⇒ Branch of Anterior division of Internal Iliac Artery;

c) Median Sacral Artery ⇒ Branch of Aorta

* venous drainage ⇒ a) Superior Rectal vein → Drains into Inferior Mesenteric vein.

b) Middle Rectal vein → Drains into Internal iliac vein;

c) Median Sacral vein → Joins Left common iliac vein.

MALE

FEMALE

COMMON

① Mesonephric Duct
(Wolffian duct) ⇒

(collecting tubules; Minor calyx; Major calyx;
Pelvis, Ureter & Trigone of the bladder)

- Epididymis
- vas - deferens
- Seminal vesicles
- ejaculatory duct
- Mesoderm of Prostate

- Gartner's duct
(Remnant)

② Paramesonephric Duct
(Müllerian duct) ⇒

Prostatic Utricle
Appendix of Testis

- Fundus
- Body
- Cervix
- Upper 2/3rd of vagina
- Fallopian tubes

(Lower 1/3rd of vagina is derived
from Sinovaginal bulbs formed
from "Urogenital sinus")

↳ endodermal in origin.

↳ Klu "organ of Rosen"

Epoophoron &
Para-oophoron

③ Mesonephric tubules ⇒

Paradidymis
(Not functional)

④ Genital tubercle ⇒

Penis

Clitoris

⑤ Genital swelling ⇒

Scrotum

Labia Majora

⑥ Genital fold ⇒

Ventral aspect of Penis

Labia Minora

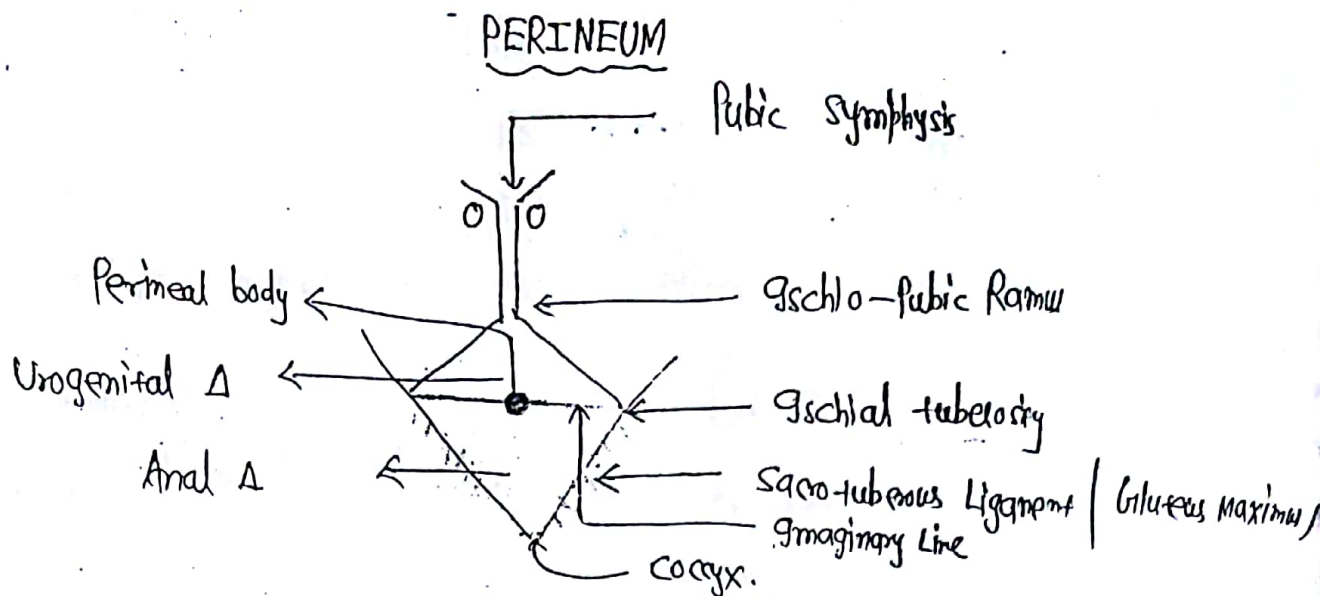
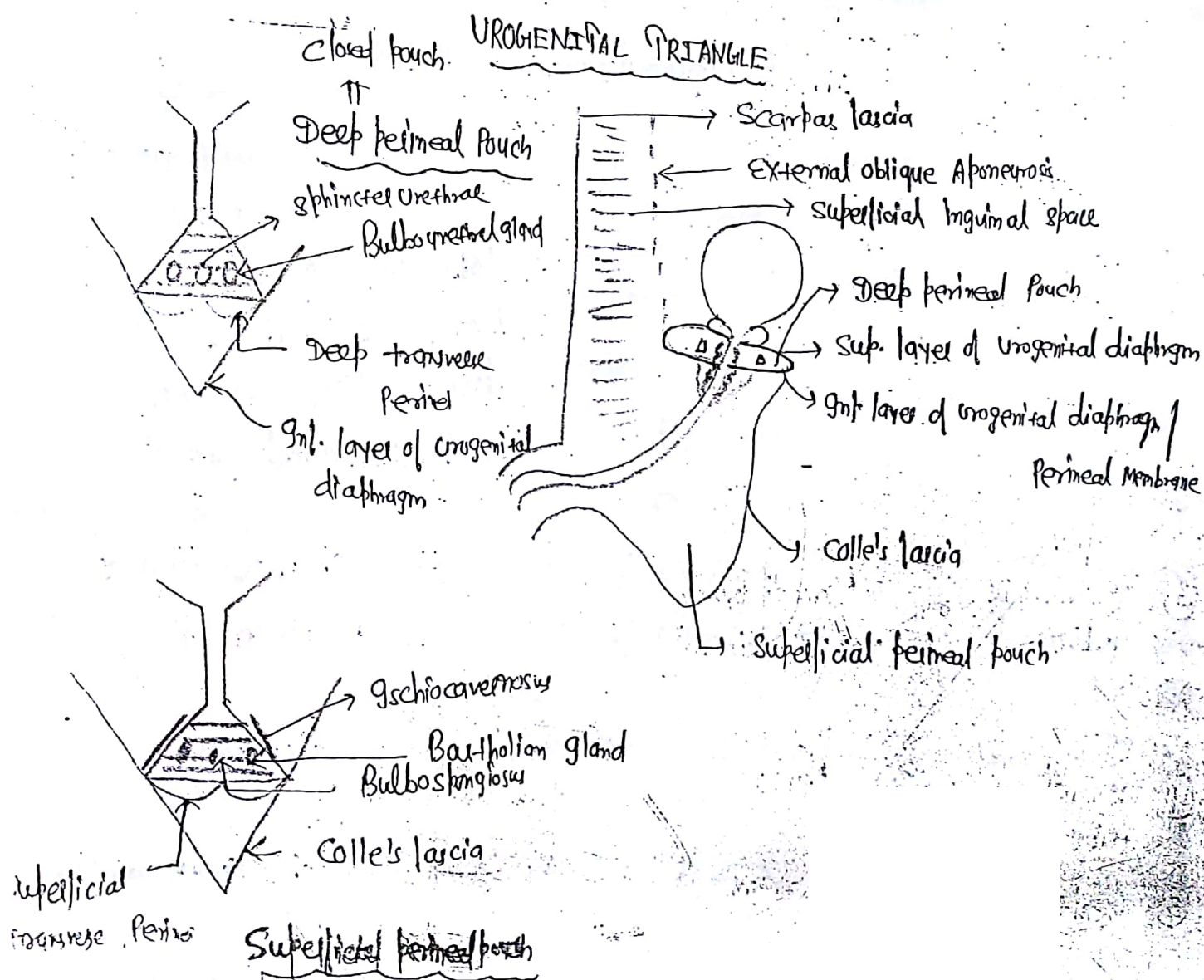


Fig: Boundaries of Perineum In Lithotomy Position



Deep Perineal Pouch ⇒

- Contents ⇒
- i> Sphincter Urethral Muscle
 - ii> Deep transverse Perineal
- } (common in ♂/♀)

- In Males ⇒
- i> Bulbourethral gland / Cowper's gland
 - ii> Dorsal Nerve of Penis
 - iii> Membranous Urethra

Superficial perineal Pouch ⇒

- Contents ⇒
- i> Ischio-cavernosus
 - ii> Bulbo-spongiosus
 - iii> Superficial transverse Perineal
- } (common in ♂/♀)

In Females ⇒ Bartholin glands / Greater vestibular glands

In Males ⇒ Root of Penis (Bulb & urethra); Posterior scrotal Nerve; Urethra

* Chief Nerve of Perineum → Pudendal Nerve (Mixed Nerve)
↓
Arises from Sacral plexus (S_2, S_3).

* PERINEAL BODY ⇒ Ten Muscles converge →

- a> External Anal Sphincter;
 - b> Fibres of Longitudinal Muscle coat of Anal canal
 - c> Bulbospongiosus;
 - d> Superficial transverse Perineal;
 - e> Deep transverse Perineal;
 - f> Levator Ani
- } Unpaired
- } Paired

Holden's Line \Rightarrow A Line drawn Laterally from Pubic tubercle,

\hookrightarrow Urine doesn't cross this line d/t firm attachment of Fascia lata along this line

- * Length of Prostatic urethra \Rightarrow 4cm (Most dilatable part of male urethra)
- Length of Membranous urethra \Rightarrow 1.5-2cm (Narrowest part of urethra) ^{NEET 16}
- Length of Penile urethra \Rightarrow 15-20cm

Least dilatable part \Rightarrow External Urethral Meatus
Membranous urethra

Anal canal \Rightarrow Length \Rightarrow 38 mm (3.8 cm)

| |
|----|
| 15 |
| 15 |
| 8 |

Dentate / Pectinate Line \Rightarrow Represents the Lower end of Anal columns

White line of Hilton \Rightarrow Represents the Mucocutaneous junction of Anal canal

Extravasation of Urine / Rupture of Urethra in the Superficial perineal Pouch



- \rightarrow Urine collects in the scrotum, penis & enters the superficial inguinal space;
- \rightarrow Urine doesn't cross the Holden's Line;

* ALCOCK'S CANAL \Rightarrow k/as "Pudendal canal"



It is fascial canal in the lateral wall of ischiorectal fossa; enclosing Pudendal Nerve & Internal Pudendal vessels (Artery & vein);

It is space b/w obturator fascia & Lunate fascia.

* MESORECTUM (MESENTRY OF THE RECTUM) & ITS CONTENTS ⇒

- Superior Rectal Artery & its branches;
- Superior Rectal vein & Tributaries;
- Superior Rectal & Pararectal Nodes and Lymphatics along Superior Rectal Artery;
- Branches from the Inferior Mesenteric plexus & descend to innervate the Rectum.

SOME EXTRA EDGE

→ Grubernaculum in Male form ⇒ Grubernaculum Testis ;
In Female form ⇒ Ligament of ovary ;
Round Ligament of Uterus.

* Differentiation of Genital Ridge ; Into Lineage of Female or Male gonads i.e. Ovary or Testis occurs @ 6-10 weeks. By 12 weeks this differentiation has occurred in all fetus.

* Prostate Analog in ♀ ⇒ Skene gland (Periurethral gland) ;

* Uterus & vagina Analog in ♂ ⇒ Prostatic Utricle

* Lower 1/3rd of vagina derived from ⇒ Urogenital Sinus.

* Upper 1/3rd of Rectum ⇒ covered by Peritoneum on the front &

* Middle 1/3rd of Rectum ⇒ covered by Peritoneum on the sides only.

* Lower 1/3rd of Rectum ⇒ Devoid of Peritoneal Attachment.

ISCHIO-RECTAL FOSSA

Boundaries -

- Anteriorly - Imaginary line joining two ischial tuberosities.
- Posteriorly - Sacrotuberous Ligaments & Coccyx
- Laterally - Ischial tuberosity & obturator Internus
- Medially - Anal canal
- Roof - Levator Ani
- Floor - Perineal skin

Contents

- ① Pudendal Nerve & vessels
- ② Inferior Rectal Nerve & vessels

TRIGONE OF BLADDER

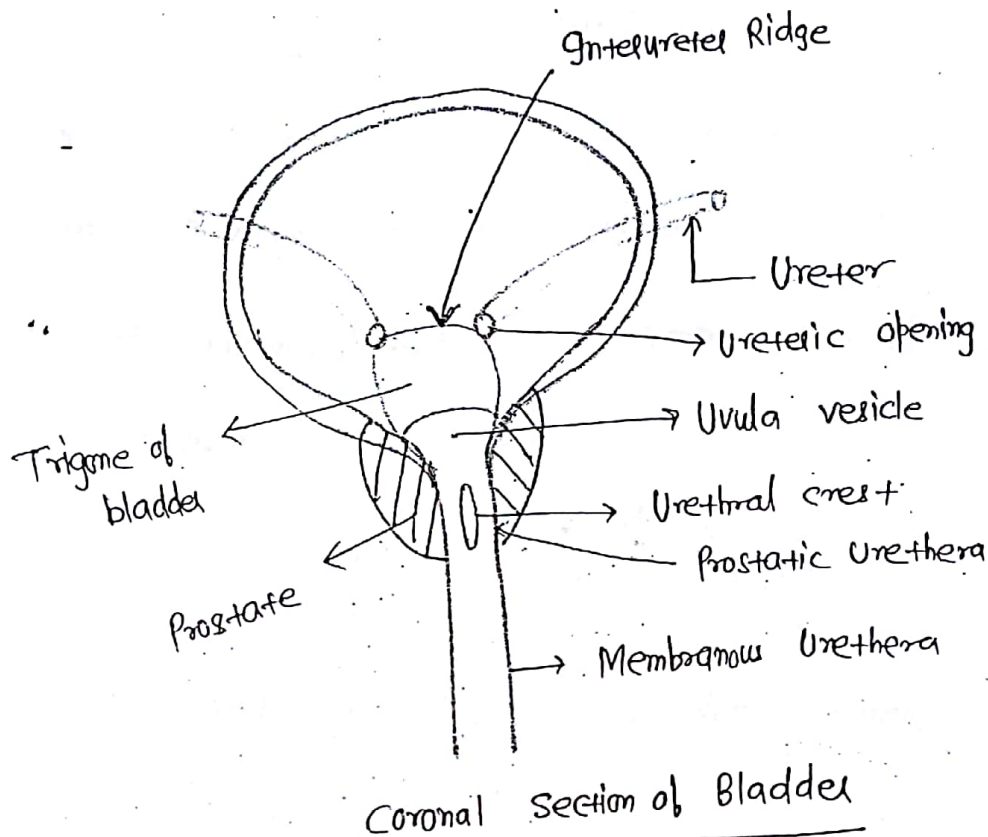
- Lined by "Transitional epithelium"
- Mucosa is smooth & firmly Adherent;
- Ureters opens at lateral Angle of base & internal urethral orifice lies at Apex;

NEFT 16
- Has Trigonal Muscle of bell (Smooth Muscle Layer just beneath Mucosa)
Derived from Absorbed part of Mesonephric duct (wolffian duct)

- In the Region of Trigone, Muscular coat (Detrusor Muscle) is separated from Trigonal Muscle of Bell by "Fascia of Waldeyer".
 - Layer of Smooth Muscle just beneath the Mucosa of Trigone.
 - It Replaces "Submucous coat in Trigone Area".

* Interureter Ridge \Rightarrow k/a "Mercier's bar"
 \rightarrow Length \rightarrow 2.5 cm; when empty & 5 cm; when full

* Micturition centre \Rightarrow Cerebral cortex \rightarrow Medial frontal cortex
 Brain stem \rightarrow Pons (Barrington's cortex).



* LAYER OF SCROTUM \Rightarrow i) Skin;

ii) Dartos Muscle (Smooth Muscle Layer) \Rightarrow Continues c Colles Fascia of Perineum posteriorly - and Scarpa's fascia & Camper's Fascia Anteriorly.

iii) The external Spermatic Fascia \Rightarrow Extension from external oblique.

iv) The cremasteric Muscle \Rightarrow Continues c fascia from Internal Oblique.

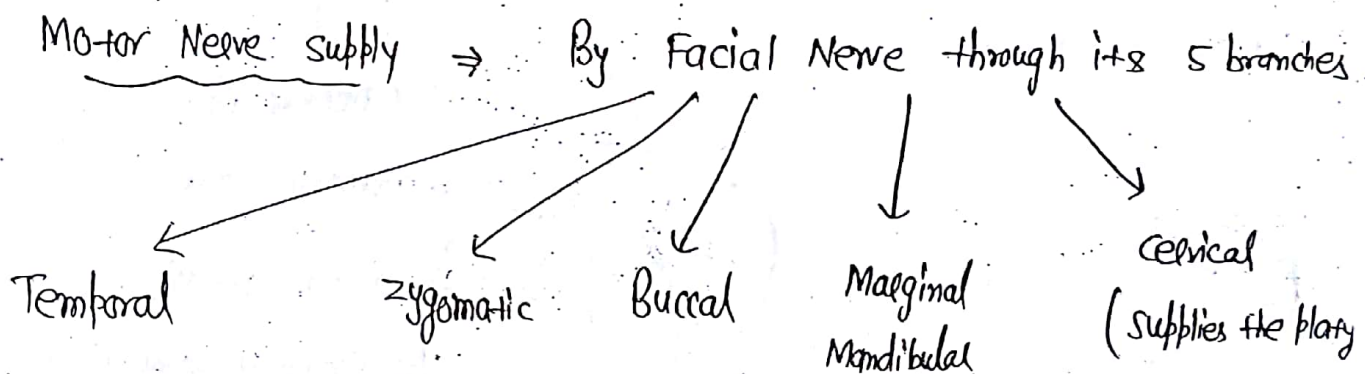
v) The internal Spermatic Fascia \Rightarrow continues c fascia from Fascia transversalis.

HEAD, FACE, NECK

NERVES OF THE PHARYNGEAL ARCH

- 1st Pharyngeal Arch \Rightarrow Mandibular
 2nd Pharyngeal Arch \Rightarrow Facial
 3rd Pharyngeal Arch \Rightarrow Glossopharyngeal
 4th Pharyngeal Arch \Rightarrow Superior Laryngeal
 ... 6th Pharyngeal Arch \Rightarrow Recurrent Laryngeal
 (5th Arch \Rightarrow Disappears)

\rightarrow each half of the face is supplied by 14 Nerves;
 1 Motor & 13 sensory.

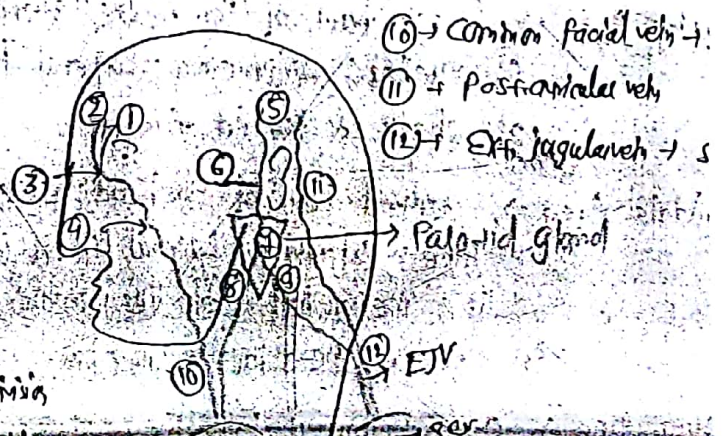


\rightarrow Facial N. Supplies all facial muscles except \Rightarrow Levator palpebrae superioris
 \Downarrow
 By 3rd CN

Venous drainage of Face \Rightarrow

- ① \rightarrow Supra-orbital vein
- ② \rightarrow Supra-trochlear vein
- ③ \rightarrow Angular vein
- ④ \rightarrow Facial vein
- ⑤ \rightarrow Superficial temporal vein
- ⑥ \rightarrow Maxillary vein
- ⑦ \rightarrow Retro-mandibular vein

⑧ Ant. division



DANGEROUS AREA OF FACE

Upper lip & in lower part of Nose

↓ Infection from Dangerous Area

Facial vein

Angular vein

Superior ophthalmic vein

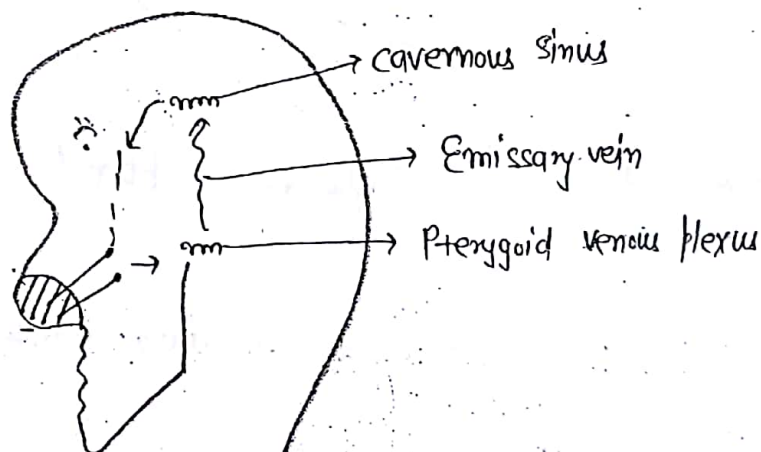
Cavernous sinus

Deep Facial vein

Pterygoid venous plexus

Emissary vein

Cavernous sinus



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* Lymphatic drainage of Face ⇒

Upper Area ⇒ Greater part of forehead; Lateral 1/2 of eyelids; conjunctiva; Lateral part of cheek & Parotid Area.

Middle Area ⇒ Central part of forehead; External Nose; upper lip; Lateral part of Lower lip; Medial half of eye-lids; Medial part of cheek & Greater part of Lower jaw.

Lower Area ⇒ Central part of Lower lip & chin.

I. Upper Area ⇒ By Pre-Auricular

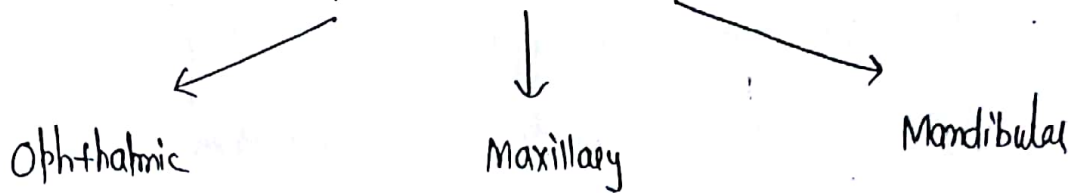
Parotid Nodes / superficial Parotid Nodes

II. Middle Area ⇒ By Sub Mandibular Nodes

III. Lower Area ⇒ By Sub-Mental Nodes

* Sensory Nerve supply of the Face ⇒

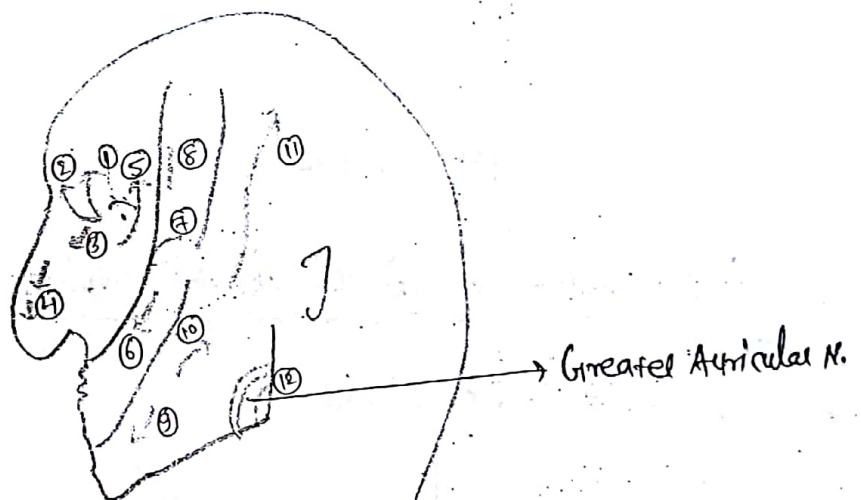
is by Trigeminal Nerve through its three division ⇒



except ⇒ Skin over Angle of Mandible

Supplied by Greater Auricular Nerve

Branch of cervical plexus.



1. Supra-orbital N.
2. Supra-trochlear N.
3. Infra-trochlear N.
4. External Nasal N.
5. Lacrimal N.

6. Infra-orbital
7. Zygomatico-acial N.
8. Zygomatico-temporal N.

9. Mental N.
10. Buccal N.
11. Auriculo-temporal N.

"Tip of Nose & Lower part of dorsum of Nose" are supplied by this

* Structure piercing Buccinator \Rightarrow

- ① Parotid duct / Stenson duct
- ② Duct of Molar gland;
- ③ Buccal branch of Mandibular Nerve

* Structure pierced by Parotid Ducts Are \Rightarrow

1. Buccal Pad of Fat;
2. Buccopharyngeal Fascia;
3. Buccinator Muscle;
4. Mucous Membrane of cheek opposite to 2nd upper Molar teeth;

ATMS

Buccal branch of Facial Nerve supplies Buccinator but doesn't pierce it.

* Artery supply of Face \Rightarrow

Anastomosis @ the Medial Angle of eye \Rightarrow

External carotid A.



Facial A.

Internal carotid A.



Ophthalmic A.



Dorsal Nasal branch



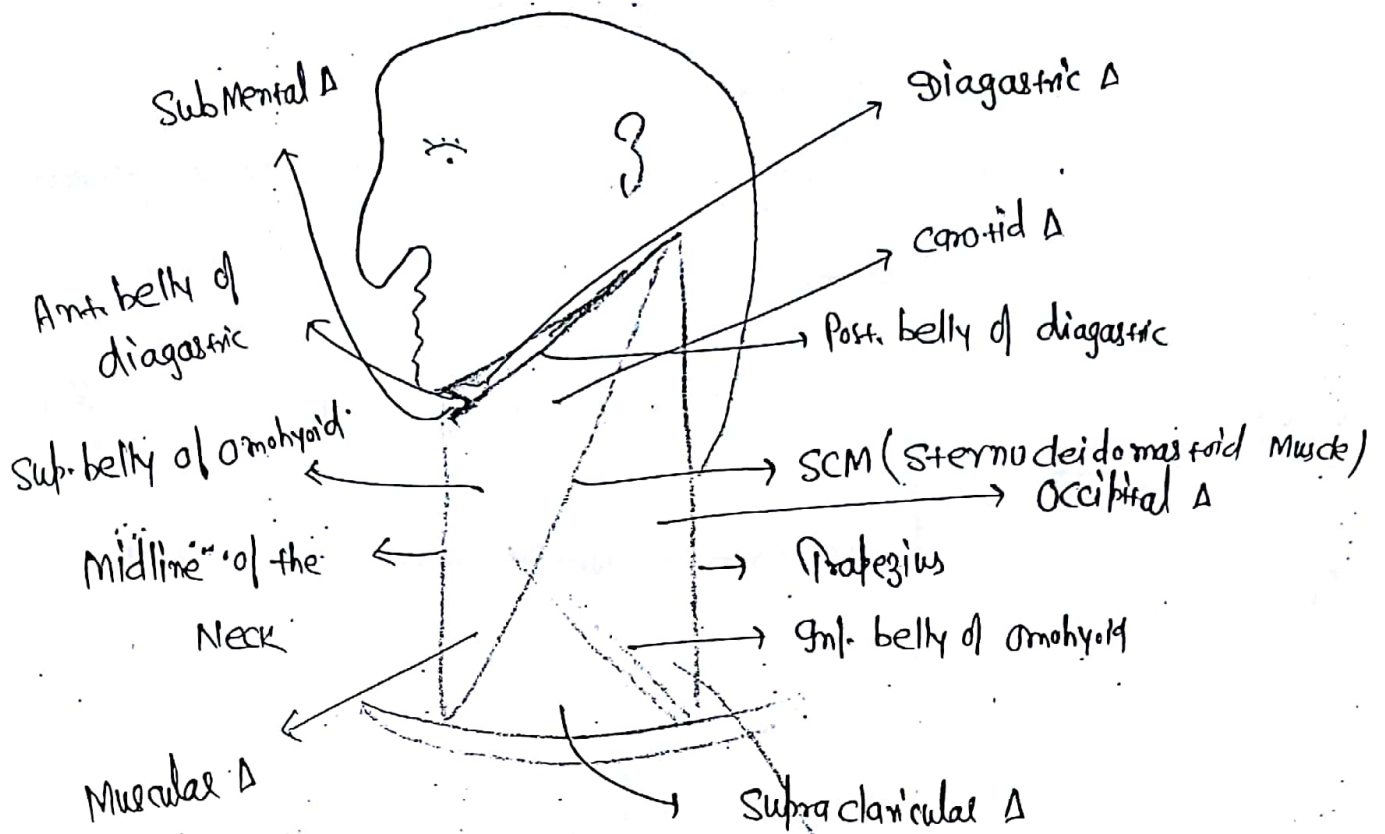
* Tortus Arteries \rightarrow



These arteries are twisted & winds in a "tortuous" path.

1. Splenic Artery;
2. Uterine Artery;
3. Facial Artery;
4. PICA (Post. inf. cerebellar A.)

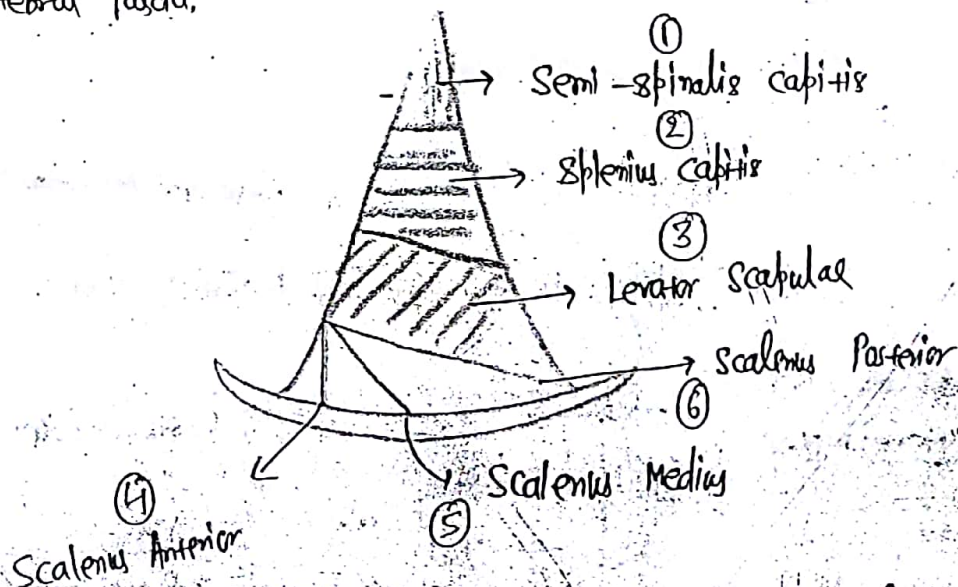
TRIANGLES OF THE NECK



* Floor of Posterior triangle ⇒ From Above downwards formed by

* Floor is covered by Pre-vertebral fascia.

* Axillary sheath is derived from pre-vertebral fascia.



* Danger space in the Neck ⇒

Superiorly ⇒ Skull Base
Anteriorly ⇒ Alar Fascia
Posteriorly ⇒ Prevertebral fascia

Contents of Posterior Δ ⇒

- a) Supra-clavicular part of brachial plexus;
- b) Subclavian artery;
- c) Spinal Accessory Nerve - Lies on the Levator Scapulae;
- d) cervical plexus

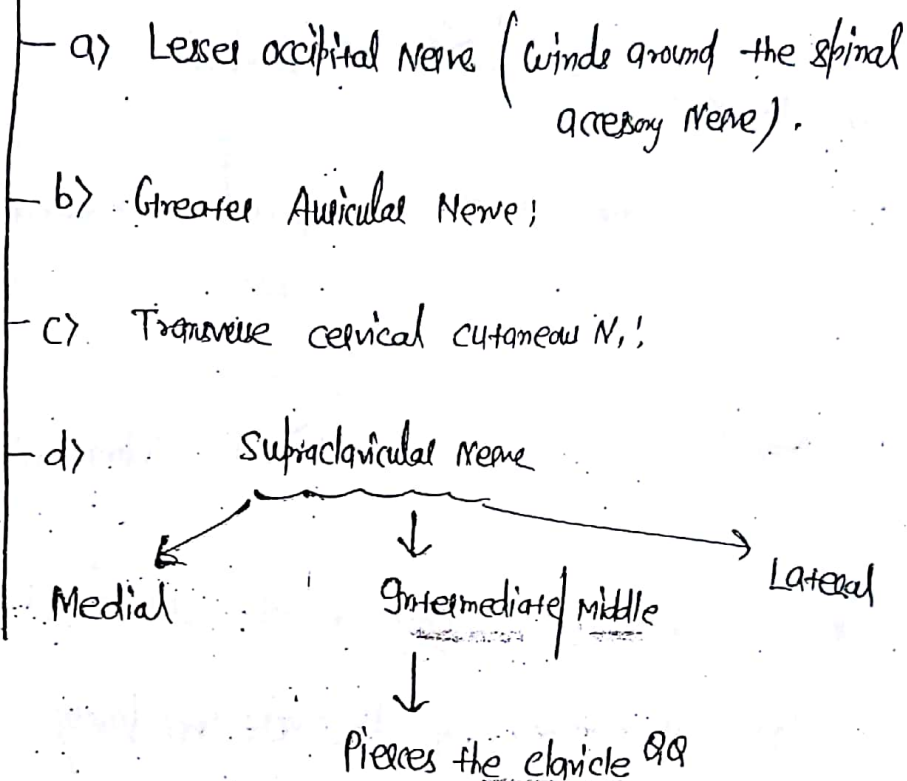
Damage to it in the Posterior Δ of Neck leads to → ...

Paralysis of Trapezius

(difficulty in shrugging of shoulder;

• difficulty in overhead Abduction;

• winging of Scapula).



e) occipital artery.

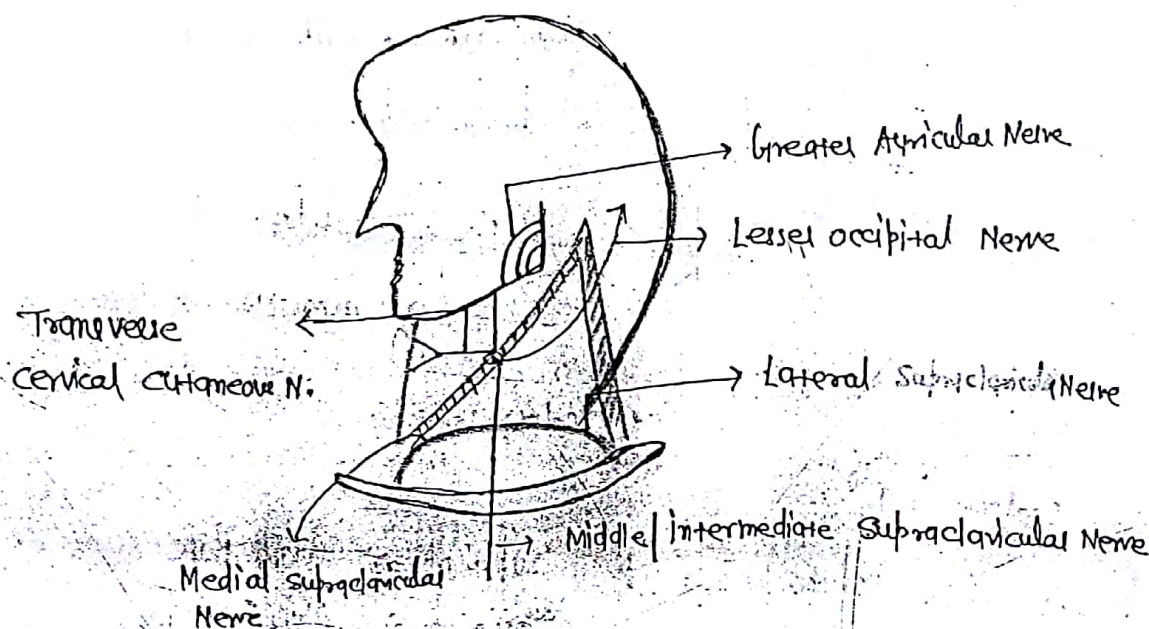


Diagram of cervical plexus in Posterior Δ

*

Clinical sign of different Porto-Systemic circulation \Rightarrow

esophageal varices (Bleeding)

Hemorrhoids

Caput Medusae

PORTAL HYPERTENSION

NEET '16

1. TEMPORARY MUCOSAL FOLDS \Rightarrow Mucosal fold; which are obliterated by distension.

Eg: Gastric Rugae of stomach & Longitudinal fold.

2. PERMANENT MUCOSAL FOLDS \Rightarrow eg: Plica circularis (valves of Kerkrin of Small Intestine;

- Crescentic Mucosal folds of cystic duct (spiral valve of Heister)
- Transverse (Horizontal) Rectal folds (Houston's valve or plica transversalis);

- Permanent Longitudinal Rectal columns or folds (Found in Lower Rectum. Anal canal).

NEET '16

PETIT TRIANGLE (Inferior Lumbar triangle)

Boundaries \Rightarrow Base \Rightarrow Iliac crest.

Anterior Boundary (Abdominal Boundary) \Rightarrow Posterior border of External oblique Mu

Posterior Boundary (Lumbar Boundary) \Rightarrow Anterior border of LATTISSIMUS dorsi

Floor \Rightarrow Internal oblique Muscle

PELVIS

* Structures winding Around Ischial spine →

P → : Pudendal Nerve

I → Internal Pudendal vessels

N → N. to obturator internus

they leave the pelvis through greater sciatic foramen and enter the perineum through lesser sciatic foramen

- The tendon of obturator internus emerges out through lesser sciatic foramen.

* Blood supply of pelvis ⇒

- Internal iliac Artery - Small terminal branch of common iliac A.

Anterior division

Posterior division

- Superior Vesical Artery

- Superior Gluteal Artery

- Inferior vesical Artery (Supplies the prostate)

- Lateral Sacral Artery

- Middle Rectal Artery

- Ilio-Lumbar Artery

- Obturator Artery

It supplies L. vertebrae

- Uterine & Vaginal Artery

While Accessory (Aberrant) obturator Artery is the branch of Inferior epigastric Artery

- Inferior Gluteal Artery

It is the branch of external iliac Artery

- Internal Pudendal Artery

Inferior epigastric A.

Femoral A.

Deep circumflex iliac A.

In female it is replaced by "Uterine & Vaginal Artery".

URETER

- Length \Rightarrow 25 cm (10 inches)
- completely Retroperitoneal organ.

Abdominal Part -

Post. Relation \rightarrow Transverse process of Lumbar process;
Psoas Major
Genito-femoral Nerve

Ant. Relation of Right Ureter \rightarrow 3rd Part of duodenum

- R. colic vessels
- ilio-colic vessels
- Root of Mesentery
- Gonadal vessels
- Terminal part of ileum

Ant. Relation of Left Ureter \rightarrow Left colic vessels

Sigmoid vessels

Sigmoid Mesocolon

Gonadal vessels

Pelvic part - goes backwards along greater Sciatic Notch above internal iliac vessels behind it.

- turns anteriorly at ischial spine & enters the subolateral angle of Trigone of bladder

- In Males; the ureter is crossed by vas deferens

- In Females; the ureter is crossed by uterine artery

Blood supply of Ureter \Rightarrow

- ① At its beginning \rightarrow Renal Artery;
- ② Below it \rightarrow Abdominal Aorta;
- ③ Little below it \rightarrow Gonadal Artery;
- ④ At the Pelvic inlet \rightarrow Internal iliac / common iliac
- ⑤ Near the base of bladder \rightarrow
 - Superior vesical
 - Inferior vesical
 - Middle Rectal

Constriction of Ureter \Rightarrow Diameter = 3mm

- ① Pelvi-ureteric junction
- ② Crossing of the pelvic brim / bifurcation of common iliacs / crossing of external iliac
- ③ Crossing by the ductus deference / Broad Ligament
- ④ Entry into the bladder (Narrowest part of Ureter)
 \rightarrow K/as "vesicoureteric junction"
- ⑤ Opening into the Trigone

URINARY BLADDER

QA

Retropubic space of Retzius

\hookrightarrow Lies behind the Pubic symphysis
 \Downarrow
contains vesicle venous plexus

- * except \rightarrow Trigone; Rest all are derived from "Vesicourethral canal" (endodermal)
- * 1st desire of Micturition usually appears @ 150-250 ml filling.

* Base of the bladder !

In Males →

- Separated from the Rectum in the upper part is by Recto vesicle pouch
- Related to vas deferences, Ampulla of vas, Seminal vesicle ejaculatory duct.

In Females

- Related to supra-vaginal part of the cervix & vag.

Fascia of Denonvilliers → extends from Rectovesicle pouch to the perineal body

↳ Separates the Rectum from seminal vesicle & prostate in Males.

* N. supply !

Sympathetic ! → T₁₀ - L₂

↳ contracts the sphincter & Relaxes the Mus

Parasympathetic ! → S_{2,3,4}

↳ contracts the Muscles & Relaxes the sp

* epithellum of Bladder Mucosa ! → Transitional

URETHRA

Male Urethra on Section → At bulb → Trapezium

In the Penis → Horizontal slit

At base of glans → Inverted "T" shape

At external urethral orifice → Vertical slit

Epithelial lining

→ Above the opening of ejaculatory duct → Transitional

Up to middle of gland

→ Columnar

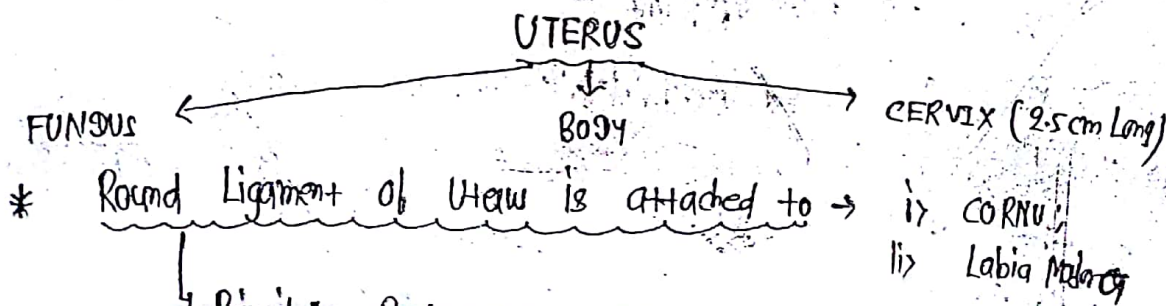
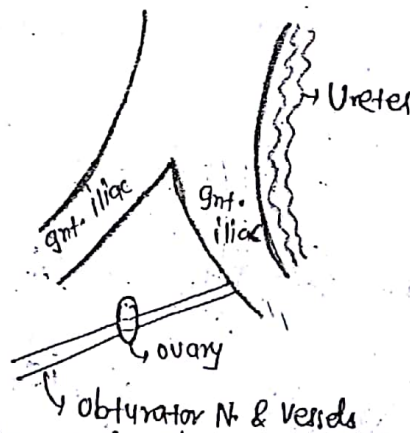
OVARY

- Suspended from posterior leaflet of broad Ligament by Mesovarium
- Attached to cornu of the uterus by Ligament of ovary and Lateral pelvic wall by suspensory Ligament of ovary / Infundibulo-pelvic Ligament.
- drains into the para-aortic Lymph Nodes.

OVARIAN FOSSA

Boundaries →

- Superiorly → external iliac vessels
- Posteriorly → Ureter & Internal iliac vessels
- Laterally & the floor → Obturator Nerve & vessels



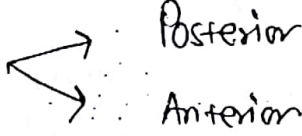
* Roof of Posterior triangle \Rightarrow

Investing Layer of Deep cervical fascia -
It encloses \Rightarrow

2 Muscles \Rightarrow a) Semo - Cleido - Mastoid
b) Trapezius.

2 spaces \Rightarrow a) Supra clavicular
b) supra - sternal


2 Glands \Rightarrow a) Sub - Mandibular
b) Parotid

Form Roof for 2 triangles  Posterior
Anterior

Anterior Triangle

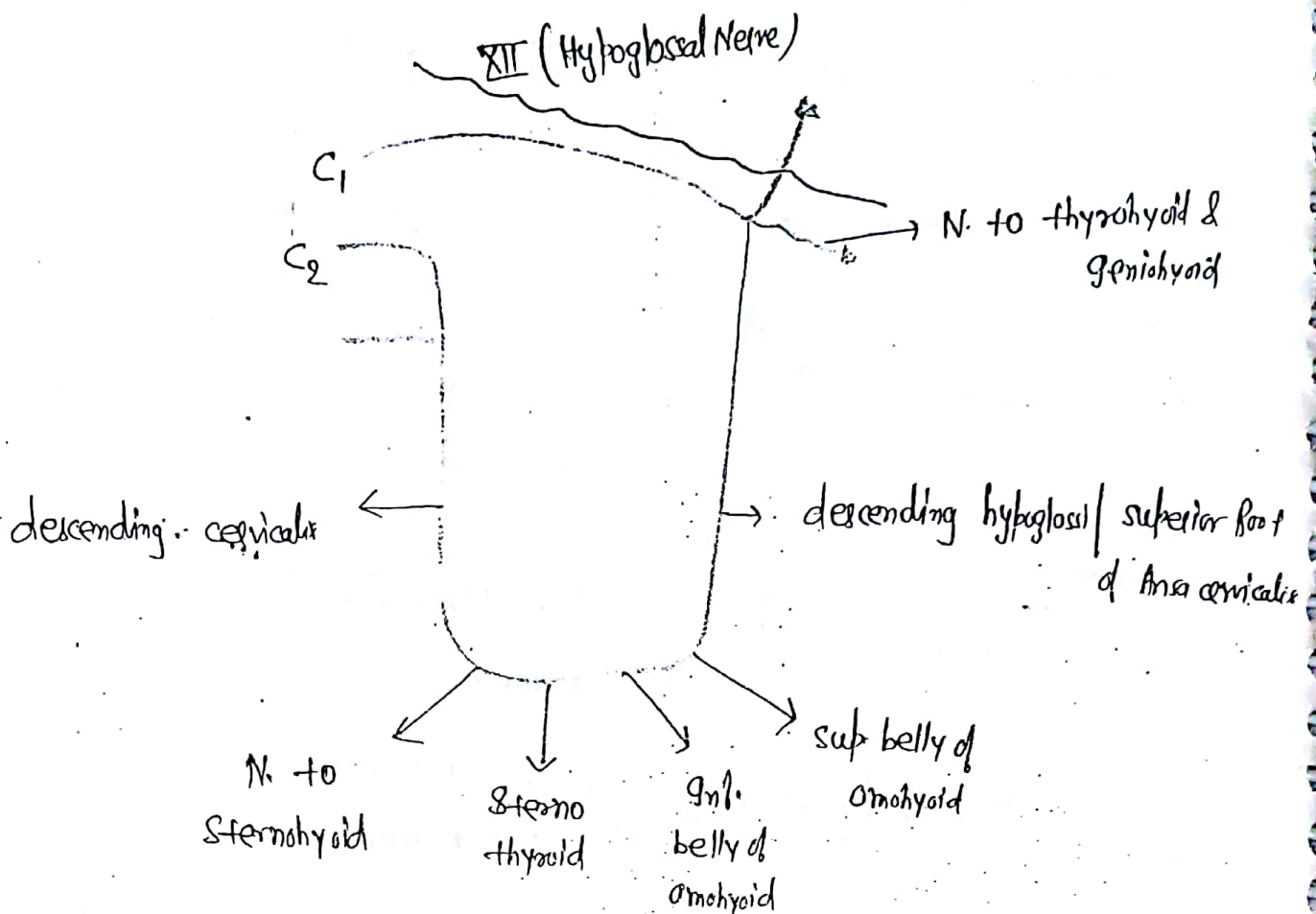
* Muscular Δ \Rightarrow

a) Sternohyoid muscle
b) sterno - thyroid muscle
c) Thyrohyoid muscle
d) omohyoid muscle

 \rightarrow Infrahyoid Ribbon Muscle

ANSA CERVICALIS

* It lies on Anterior wall of carotid sheath.



* "Thyrohyoid & Geniohyoid" are supplied by separate branch of C₁ Nerve through hypoglossal Nerve.

THE COMMON CAROTID ARTERY

- divides at the superior border of lamina of the thyroid cartilage.
- Muscle b/w the 2 carotids \Rightarrow Styloglossus & Stylopharyngeus

Branches of External carotid Artery \Rightarrow

- (A) Anterior Branches \Rightarrow
- Superior thyroid
 - Lingual
 - Facial

② Posterior Branch \Rightarrow Post. Auricular
occipital

③ Medial Branch \Rightarrow Ascending Pharyngeal

④ Terminal Branch \Rightarrow Superficial temporal
Maxillary

* Carotid Pulse \Rightarrow Can be felt along the SCM muscle @ the Level of
Laryngeal prominence 9A

MUSCLE OF MASTICATION

Masseter (elevation of Mandible)

Medial Pterygoid

Temporalis $\begin{cases} \text{Vertical fibres} \Rightarrow \text{elevation} \\ \text{Posterior fibres} \Rightarrow \text{Retraction} \end{cases}$

Lateral Pterygoid \rightarrow Upper head \Rightarrow Depression

\rightarrow Lower head \Rightarrow Protrusion

— N. Supply of all Muscles \Rightarrow Mandibular Nerve

* BOUNDARIES OF POSTERIOR TRIANGLE

Anteriorly \rightarrow Posterior border of SCM Muscle.

Posteriorly \rightarrow Anterior Margin of Trapezius;

Base \rightarrow Superior surface of middle third of clavicle

* BOUNDARIES OF DIAGASTRIC TRIANGLE

Anteriorly \rightarrow Base of Mandible & A line extending 1/3 Angle to Mastoid.

Below & in front \rightarrow By Anterior Belly of digastric

Below & behind \rightarrow Post. Belly of digastric

INTERIOR OF SKULL

① Foramen Rotundum \Rightarrow Maxillary Nerve;

② Foramen ovale \Rightarrow M \rightarrow Mandibular Nerve;
A \rightarrow Accessory Meningeal A.
L \rightarrow Lesser Petrosal Nerve
E \rightarrow Emissary vein

③ Foramen spinosum \Rightarrow Nervus spinosus / Meningeal branch /
Recurrent branch of Mandibular Nerve;
Middle meningeal vessels;

④ Foramen Lacerum \Rightarrow Internal Carotid A

⑤ Internal Acoustic Meatus \Rightarrow 7th, 8th & Vestibulocochlear vessels

⑥ Jugular foramen \Rightarrow

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graph TD; JF[Jugular foramen] --> AC[Anterior compartment]; JF --> MC[Middle compartment]; JF --> PC[Posterior compartment];
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Anterior compartment
Inferior Petrosal Sinus

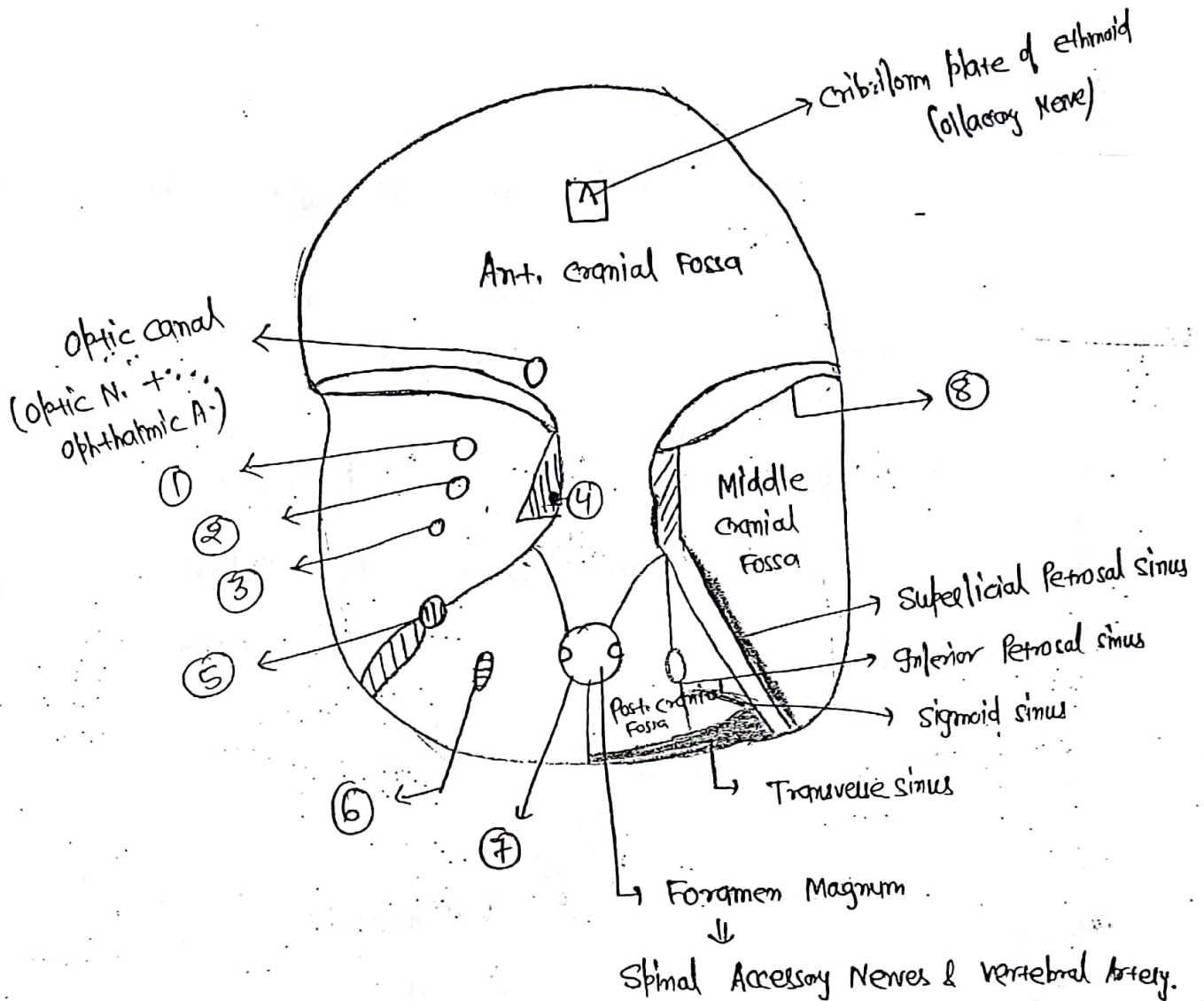
Middle compartment
- 9th, 10th, 11th
Cranial Nerve

Posterior compartment
- Sigmoid Sinus

⑦ Hypoglossal canal / Anterior condylar canal \Rightarrow Hypoglossal N.

⑧ Sup. orbital fissure \Rightarrow 3rd, 4th, 6th C.N. & ophthalmic N.

⑨ Optic canal \Rightarrow Optic Nerve & ophthalmic Artery.



* Meckel's Cave \rightarrow Trigeminal ganglion lies in it.
(Gasserian ganglion)
 \rightarrow Cave like formation of dura mater

* Contents of Parotid gland (superficial to deep) \rightarrow 1. Facial Nerve
2. Retro-mandibular vein;
3. External carotid Artery.

* Pterygoid canal \rightarrow Vidian Nerve (N. of Pterygoid canal);
Vidian Artery (Artery of Pterygoid canal);

* N. of Pterygoid canal is formed by the junction of the greater petrosal N.

MANDIBULAR NERVE

- i) Branches from the trunk;

↳ ① N. Spinosus

⇓

Enters the skull through foramen spinosum & supplies the Meninges of Middle cranial fossa.

② N. to Medial Pterygoid

⇓

Supplies the Medial Pterygoid

↳ also supplies Tensor Palati;
Tensor tympani

- ii) Anterior division

3 Muscular

1 Sensory / cutaneous

- Masseteric Nerve

- Buccal-Nerve

- Deep temporal Nerve

- N. to Lateral Pterygoid

⇓
Supplies the skin & Mucous Membrane over the buccinator

- iii) Posterior division

Lingual N.

Auriculo-temporal N.

Inferior alveolar N.

Lingual Nerve \Rightarrow Supplies General Sensation to Ant. 2/3rd of tongue

- Gt 18 joined by chorda tympani; which supplies special sensation to Anterior 2/3rd of tongue.

Auriculo-temporal Nerve \Rightarrow Supplies the skin over the Auricle & temporal Region

- \hookrightarrow Gt also carries the post-ganglionic parasympathetic fibres from Otic ganglia to parotid gland.

Inferior-Alveolar Nerve \Rightarrow Dentist Nerve

- enters the Mandibular Foramen; supplies the Lower jaw & teeth & em. out as Mental Nerve.

- Before entering the Mandibular foramen; it gives a branch - N. to Mylohyoid
 \downarrow
which supplies Mylohyoid & Ant. belly of digastric muscle

MAXILLARY ARTERY

- Branch of external carotid; given in Parotid gland

- divided into 3 parts by lateral Pterygoid muscle

\rightarrow extends upto lower border of Lateral Pterygoid muscle.

(I) 1st part \Rightarrow Deep Auricular A.

(Mandibular part)

Anterior tympanic A.

Middle Meningeal A.

Accessory Meningeal A.

Inferior alveolar A.

\rightarrow Lies in Infra-temporal fossa

(II) 2nd part \Rightarrow Masseteric A.

(Pterygoid part)

Deep temporal A.

Artery to the Pterygoid

Buccal Artery

III 3rd Palat \Rightarrow

\Downarrow

(Pterygopalatine nut)

\Downarrow

Lies in pterygo-palatine fossa.

Post. superior alveolar A.

Intra-orbital A.

Greater palatine A.

Pharyngeal A.

Artery of Pterygoid canal A.

Sphenopalatine A. (Artery of epistaxis)

AUTONOMIC NERVOUS SYSTEM

Sympathetic Nervous system \Rightarrow

The preganglionic fibres arise from Lateral horn cells of T₁ to L₂ segments of the spinal cord.

- They Pass through ventral root; spinal Nerve & enters the Symp. ganglion through white Ramus communicans
- Thus white Ramus communicans are pr. in T₁-L₂ spinal Nerves
- The fibres go to higher & lower ganglion.
- The Post-ganglionic fibres enter the spinal Nerve through Grey Rami communicans.
- Thus Grey Rami communicans is given to all the spinal Nerve.

Parasympathetic Nervous System ⇒

AIIMS Nov'16

Cranial outflow

- Arises in the brain stem
- Carried by 3rd, 7th, 9th & 10th CN
- They supply the glands

S_{2,3,4} | Nervi eregentie / Pelvic Splanchnic

Sacral outflow

- Arises in the lateral horn cells of S_{2,3,4} segments of the spinal cord (Pre-ganglionic fibres)

* All the glands in the head & Neck are supplied by Facial Nerve except → Parotid gland

||
Supplied by Glossopharyngeal Nerve

* Vagus supplies the gland of GIT

* 3rd CN supplies ⇒ Sphincter pupillae & ciliaris muscle.

↪ No gland supply.

GANGLION

↳ collection of Neuronal cells body outside the CNS.

3/7/9/10 CN
(Brain stem)

Pre-ganglionic



Post-ganglionic

Structural Relation

Glands

Functional Relation

| | | | | |
|------------|---|---------------------|------------------|---------------------------|
| | Pterygopalatine Ganglion [Spheno- palatine ganglion (Largest P.S. Ganglion)] | Ciliary Ganglion | Otic Ganglion | SubMandibular Ganglion |
| Structural | Maxillary N. | Nasociliary N. | Mandibular N. | Lingual N. |
| Functional | VII | III | IX | VII |

OTIC GANGLION \Rightarrow Relation \Rightarrow Superiorly : Foramen Ovale;

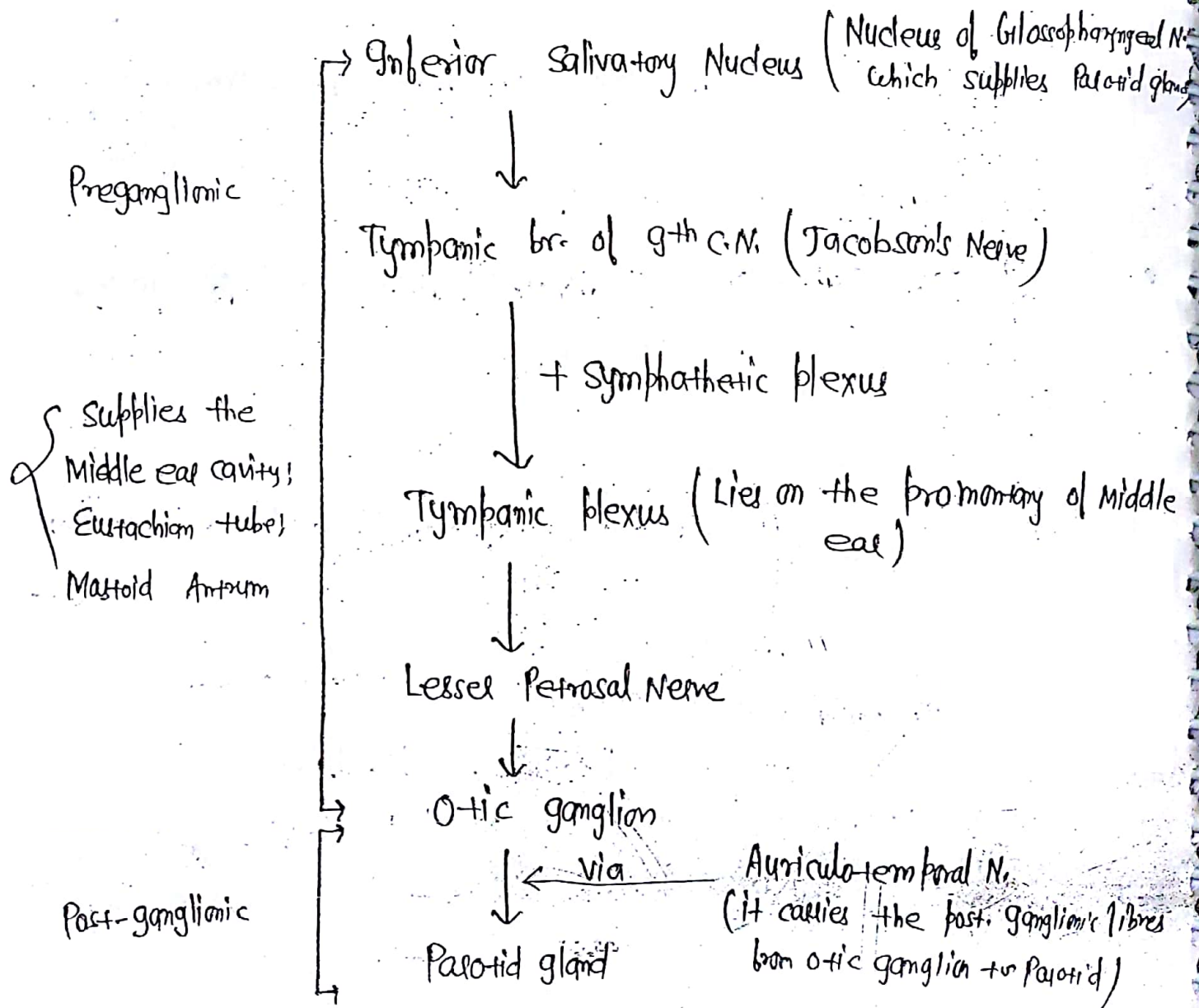
Laterally : Mandibular Nerve

Medially : Tensor Veli Palatini

Posteriorly : Middle Meningeal A.

* Otic ganglion usually surrounds
the origin of the N. to Medial Pterygoid

NERVE SUPPLY OF PAROTID GLAND \Rightarrow

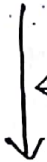


FACIAL NERVE

Superior Salivatory Nucleus (Nucleus of Facial N.)



Sensory br. of Facial Nerve
(Nervus Intermedius / N. of Wrisberg)



← joins Motor branch

Trunk of Facial N. (in the Internal ear)



Geniculate ganglion (Bend / Genu of Facial Nerve)

← Greater Petrosal N.

↓
N. to Stapedius

→ Stylohyoid
↓
Parotid
Ligament
N. to
Chorda tympani

* Chorda tympani emerges out through Petro-tympanic fissure

Submandibular ganglion

← joins Lingual

↓ & supplies

• Submandibular gland

• Lingual gland

• taste fibres from ant. 2/3rd of tongue (except circumvallate papillae)

*

Greater Petrosal Nerve joins \bar{e} deep petrosal N.

↓ Forms

Vidian Nerve | N. to Pterygoid canal ^{NEE 916}

↓

Pterygopalatine ganglion

↓ supplies

Lacrima; Nasal; Palatine & Pharyngeal gland

* crocodile tears involves submandibular & Lacrima gland.

* Vidian's Nerve irritation \Rightarrow Symptom of Allergic Rhinitis occur.

FUNCTIONAL COMPONENT OF NUCLEUS

① SPECIAL VISCERAL EFFERENT / BRANCHED-MOTOR COMPONENT :

- Supplies the Muscle derived from the pharyngeal arches.
- \oplus in 5, 7, 9, 10th CN
- Common Nucleus for 9th, 10th & cranial accessory (11th CN) is Nucleus Ambiguus

② General visceral efferent / secretory-Motor COMPONENT :

- Supplies the gland
- It represents the cranial outflow of the parasympathetic Nervous system
- \oplus in 3, 7, 9, 10th CN

③ General Somatic efferent \Rightarrow

- Supplies the Muscle derived from occipital somites (Myotome) (extra-ocular & tongue Muscle)
- \oplus nt in 3rd; 4th; 6th; 12th C.N.

* Blood Supply of Facial Nerve

- ① In Facial canal \rightarrow (a) Superficial Petrosal branch of Middle Meningeal Artery;
(b) Stylomastoid branch of Posterior Auricular or occipital Arteries,
- ② Extracranially \rightarrow (a) Stylomastoid branch of Posterior Auricular or occipital arteries
(b) Tympanic branch of Ascending pharyngeal Artery.

SINUSES

* DURAL VENOUS SINUS \Rightarrow It is outer to Meningeal Layer inner to endosteal Layer.

- The duramater divides into an endosteal and Meningeal layers to enclose the dural venous sinus.

* -

Superior sagittal sinus



Rt. transverse



Rt. sigmoid



Rt. internal jugular vein.

*

Inferior sagittal sinus



Straight sinus



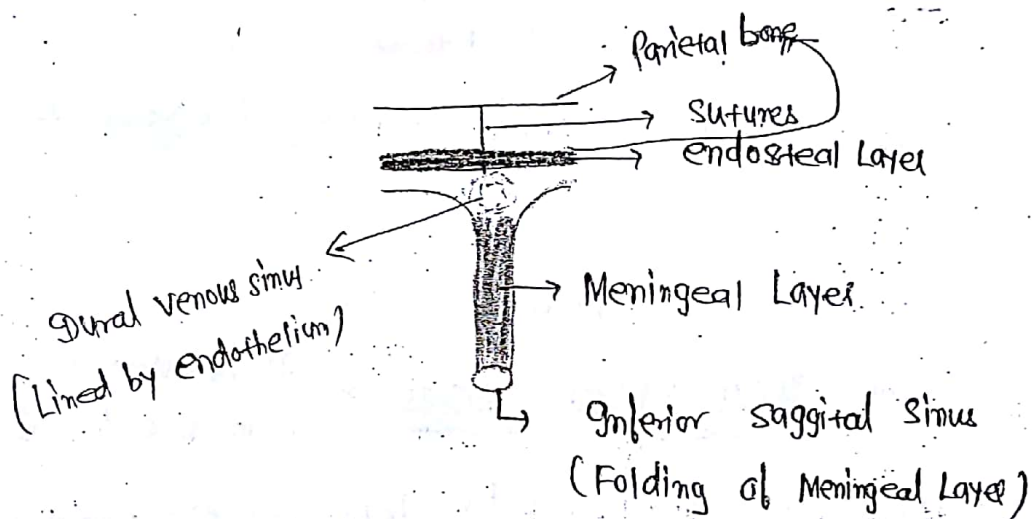
Lt. transverse



Lt. Sigmoid



Lt. Internal jugular vein

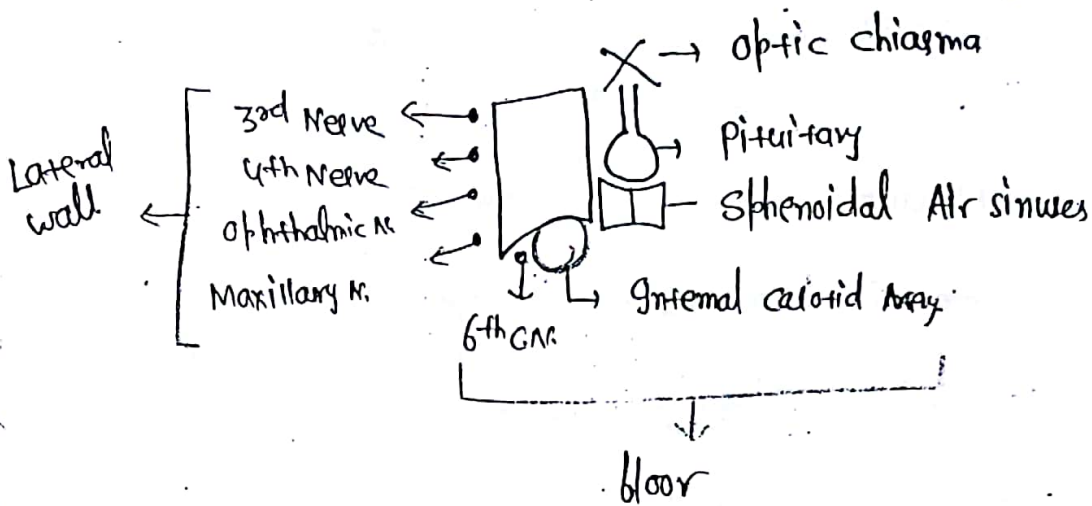


* Falx cerebri ⇒ It contains Superior sagittal sinus & straight sinus.

* Falx cerebelli ⇒ Encloses occipital sinus.

* Great cerebral vein of Galen ⇒ It is formed by the union of two internal cerebral veins; is 2 cm long & drains into the straight sinus.

CAVERNOUS SINUS



* Tributaries of cavernous sinus (Coming towards C.S.)

From the orbit

- Sup. Ophthalmic vein
- Inf. Ophthalmic vein
- Central vein of Retina

From the Meninges

- Spheno-parietal sinus

From the Brain

- Superficial Middle cerebral vein
- Inferior cerebral vein

* Draining channels (Away from cavernous sinus)

- ① Superior petrosal sinus \Rightarrow drains cavernous sinus to transverse sinus
- ② Inferior petrosal sinus \Rightarrow drain cavernous sinus to internal jugular vein / sigmoid sinus
- ③ The two cavernous sinuses are connected by An Anterior & Posterior Intercavernous sinuses
- ④ The cavernous sinus drains into pterygoid venous plexus through Emissary veins

THE PHARYNX \Rightarrow extends from base of skull to the level of 6th cervical vertebrae.

i) Structure passing b/w the superior constrictor & Base of skull | Sinus of Morgagni \Rightarrow

a) Eustachian tube. Mnemonics \Rightarrow PALE

b) Levator palati muscle

NEEP c) Ascending Palatine A.

d) Palatine branches of ascending pharyngeal A.

ii) Structure passing b/w superior & middle constrictor \Rightarrow

a) Stylopharyngeus Muscle;

b) Glossopharyngeal Nerve;

iii) b/w the middle & inferior constrictor \Rightarrow

- a) Internal Laryngeal Nerve

b) Superior Laryngeal vessels

iv) Below the inferior constrictor \Rightarrow

a) Recurrent Laryngeal N.

b) Inferior Laryngeal vessels

* Tensors of vocal cords \Rightarrow cricothyroid

\uparrow
supplied by External Laryngeal Nerve

Paralysis Results in "Loss of Timber of the voice"

* Abductor of vocal cord \Rightarrow Post. crico-arytenoid

* Safety Muscle of tongue \Rightarrow Genioglossus

It protrudes the tongue

* In lesions of hypoglossal N. the tongue is ~~not~~ deviated to same side of lesion.

* Intrinsic Muscle of Pharynx \Rightarrow Stylopharyngeus; Salpingopharyngeus; Palatopharyngeus.

* Extrinsic Muscle of Pharynx \Rightarrow Superior constrictor; Middle constrictor; Inferior constrictor.

* Foramen of Morgagni \Rightarrow Located in Thoracic Diaphragm; from which Superior epigastric A. & vein & Lymphatics pass.

- It is also known as "Sternocostal Hiatus or Larrey's Δ "

* Retropharyngeal space \Rightarrow Potential space of the head & neck; bounded by the buccopharyngeal fascia anteriorly & the Alar fascia posteriorly.

* Pharynx is subdivided into

- \rightarrow Nasopharynx \rightarrow Lined by ciliated columnar epithelium & lies above the soft palate
- \rightarrow Oropharynx
- \rightarrow Hypopharynx

* Pharyngeal opening of Eustachian tube is situated 1.25 cm behind the posterior end of inferior turbinate & &

* Key Muscle of the oral region \Rightarrow Hyoglossus

* Structure superficial to Hyoglossus Nerve \Rightarrow

- Lingual Nerve
- Submandibular ganglion
- deep part of submandibular gland
- Submandibular duct
- Hypoglossal Nerve

* Structure deep to Hyoglossus Muscle \Rightarrow Glossopharyngeal Nerve
Lingual Artery

* Structure not around submandibular duct \Rightarrow

PHARYNGEAL ARCHES

ECTODERMAL CLEFTS ⇒

- 1st E.C. ⇒ Forms the external Acoustic Meatus & Pinna
- 2nd E.C. ⇒ Grows down & fuses to the last



The Neck thus become smooth;
if it doesn't fuse → Branchial Sinus/Fistula

ENDODERMAL POUCHES ⇒

First Endodermal Pouch

Dorsal

- Forms the tubo-tympanic Recess; which forms Middle ear cavity & eustachian tube.

Ventral

- Joins to the 2nd & forms the palatine tonsil.

Second Endodermal Pouch

- Joins to ventral part of 1st E.P. & forms the palatine tonsil.

Third Endodermal Pouch

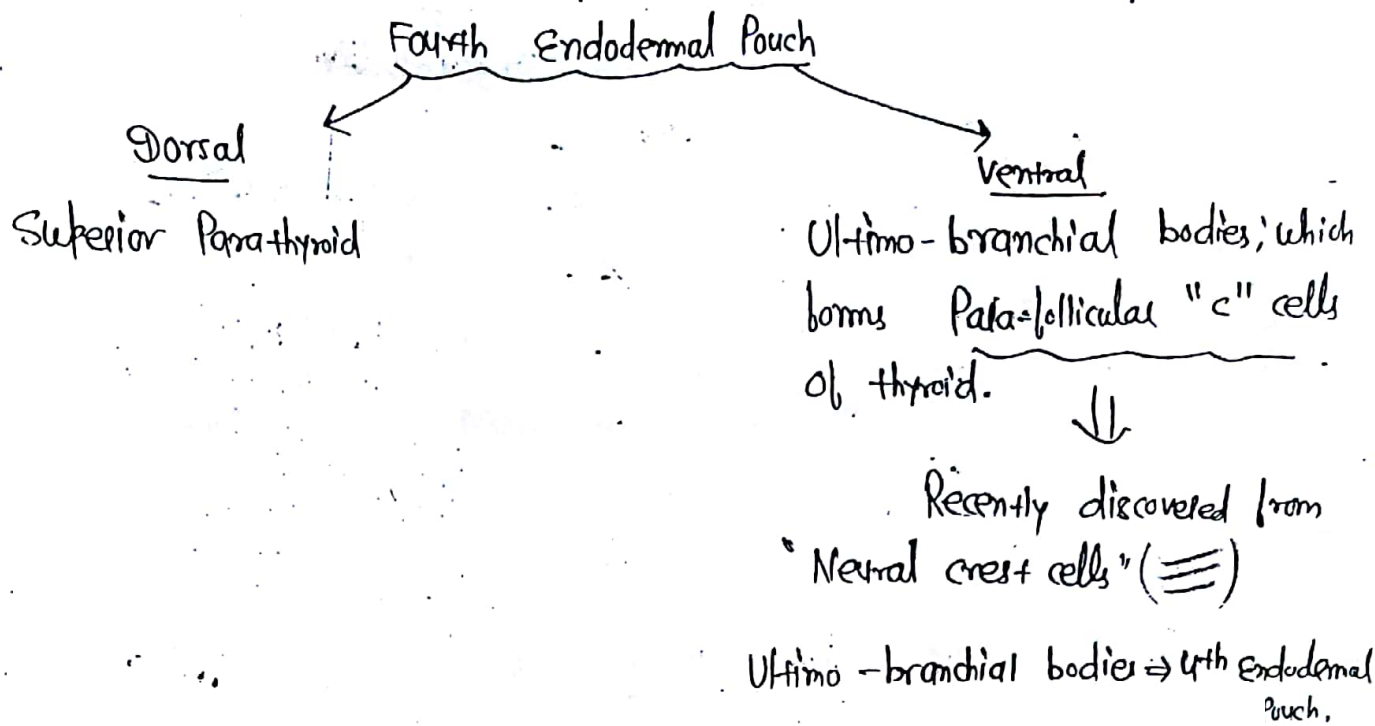
Dorsal



Inferior Para-thyroid

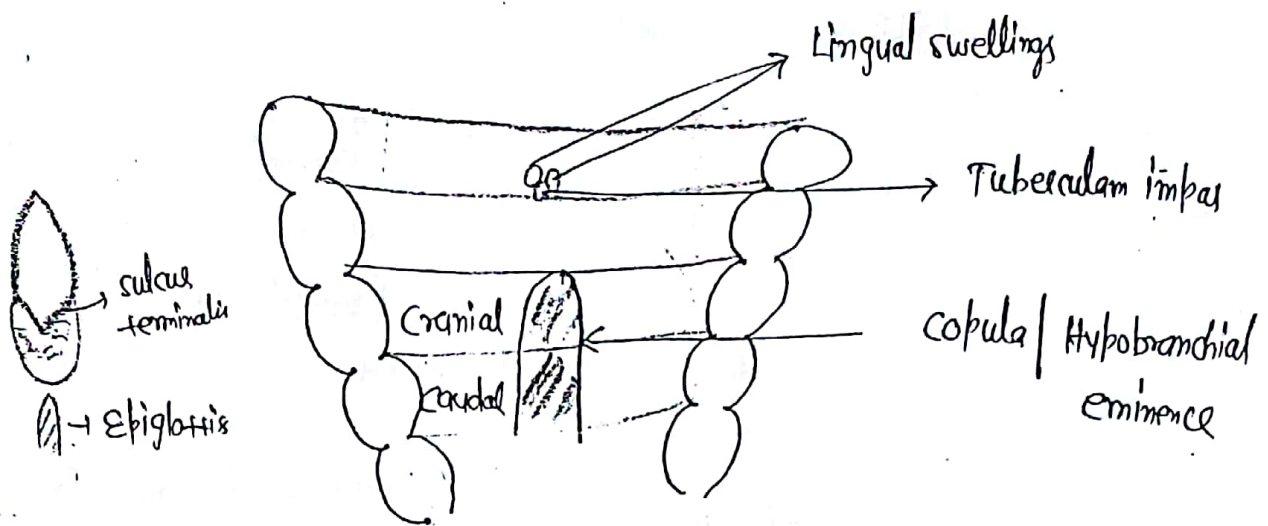
Ventral

Forms the thymus



DEVELOPMENT OF TONGUE

- Ant. 2/3rd of the tongue is derived from → 2 Lingual swellings & Tuberculum Implex.
- Post. 1/3rd of the tongue is derived from ⇒ Cranial part of hypo-branchial eminence/cotula
- Post. Most. part of the tongue & epiglottis is derived from caudal part of hypo-branchial eminence.
- Muscles of the tongue are derived from ⇒ occipital Myotomes.



* NERVE SUPPLY OF TONGUE : ⇒

| <u>PART</u> | <u>TASTE</u> | <u>GENERAL (TOUCH & TEMP.)</u> |
|---|---------------------------------------|---|
| Anterior 2/3 rd (oral part) except → circumvallate papillae | Chorda tympani (Facial Nerve) | Lingual branch of Mandibular division of Trigeminal Nerve |
| Posterior 1/3 rd including circumvallate papillae | Glossopharyngeal | Glossopharyngeal |
| Posterior Most part | Internal Laryngeal branch of vagus | Internal Laryngeal branch of vagus |

* Delphian Nodes ⇒ Also "Pre-Laryngeal Nodes".

DEVELOPMENT OF FACE

→ 5 Processes ; which takes part in formation of Face :-

- 1 Frontonasal process
- 2 Maxillary process
- 2 Mandibular process

- * Midline upper lip cleft ⇒ d/t Non-fusion of 2 Medial Nasal process
- * Hard lip / cleft lip ⇒ d/t Non-fusion of Maxillary process & Medial Nasal process
- * oblique facial cleft ⇒ Non-fusion of Maxillary process & Lateral Nasal process
- * Midline lower lip cleft ⇒ Non-fusion of 2 Mandibular process

DEVELOPMENT OF HARD PALATE

Primary / primitive palate / pre-Maxilla

⇓
Fusion of two Medial Nasal process

Secondary

⇓
Fusion of two palatine process of Maxilla

- * The Incisive foramen differentiates b/w Primary & secondary palate

PHARYNGEAL PLEXUSES

- Formed by → a) pharyngeal branch of glossopharyngeal Nerve,
 - b) Pharyngeal branch of vagus & cranial artery
 - c) A branch from superior cervical ganglion
- The Pharyngeal plexus lies on Middle constrictor muscle of the pharynx.

- It supplies → ① All the muscles of soft palate except → tensor palati.



Supplied by Mandibular N. through the Nerve to Medial Pterygoid.

- ② All Longitudinal muscle of pharynx.

↓
Stylopharyngeus Salpingopharyngeus Palatopharyngeus

↓
Supplied by Glossopharyngeal Nerve.

- ③ All the circular muscle of pharynx except cricopharyngeus part of Inf. constrictor.



External / Recurrent Laryngeal N.

VAGUS NERVE

Superior Laryngeal (4th Pharyngeal Arch)

Internal Laryngeal



pierces the thyrohyoid Membrane; passes b/w Middle & inferior constrictor; to supply the Mucous membrane of the Larynx above vocal folds.

- also supplies Posterior Most part of Tongue & Epiglottis

External Laryngeal



Supplies the Cricothyroid.

Recurrent Laryngeal (6th pharyngeal Arch)

- Lies in the tracheo-esophageal groove

- passes below inferior all constrictor to supply muscle of Larynx except cricothyroid

- Sensory supply below the vocal Folds.

BRAIN

Central sulcus is klas \Rightarrow Sulcus of Rolando.

Lateral sulcus is klas \Rightarrow Sylvian fissure.

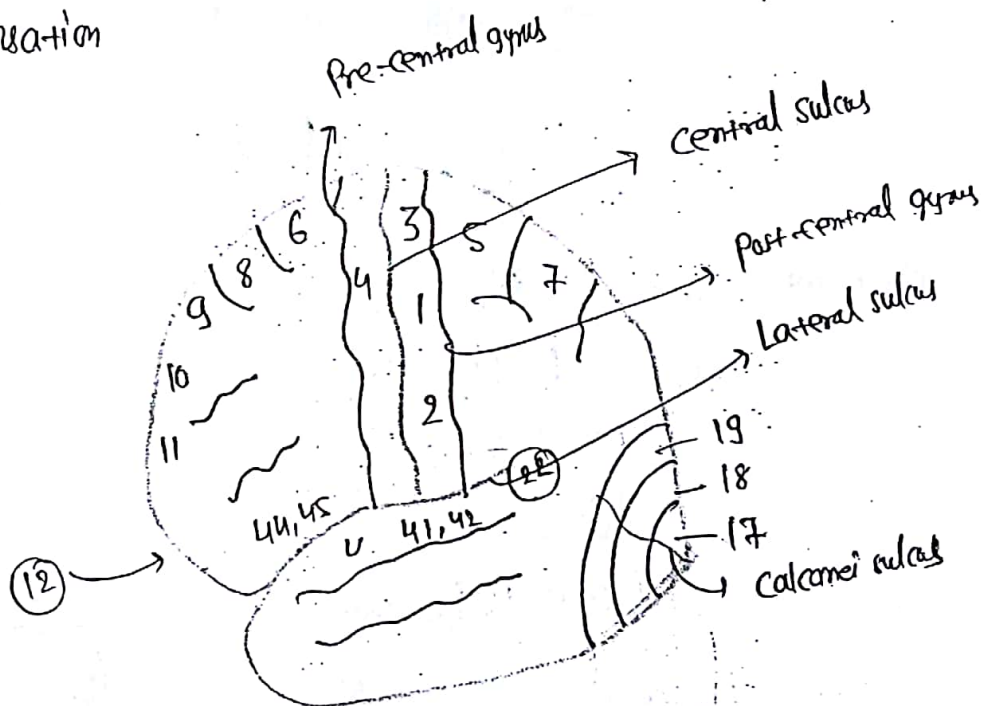
* Functional Areas \Rightarrow

Primary Area

- Perception of sensation

Association Area

- Interpretation of sensation



Area 3, 1, 2 \Rightarrow 1st Sensory Area

Crude sensation \Rightarrow Touch; Pain; temperature

Fine sensation \Rightarrow Tactile localization;

Tactile discrimination;

Stereognosis;

Vibration;

Proprioception.

1st ORDER NEURON

Crude sensation

Dorsal Root
Ganglion

2nd order Neuron

Dorsal horn cells
of spinal cord
(Substantia gelatinosa)

3rd order Neuron

Thalamus
(Ventral-posterior-
Lateral Nucleus)

Fine sensation

Dorsal Root
Ganglion

Nucleus gracilis &
Nucleus cuneatus

Thalamus -
(Ventral-posterior-
Lateral Nucleus)

Area 5, 7 \Rightarrow

Sensory Association Area

Area 17 \Rightarrow

Primary Visual Area

Visual Pathway \Rightarrow

Retina



Optic Nerve



Optic chiasma



Optic tract



Lateral geniculate body



Optic Radiate (Retrolenticular part of Internal capsule)



Area 17

Area 18, 19 \Rightarrow Visual Association Areas

* Damage to Area 18, 19 leads to \Rightarrow Visual Agnosia / word blindness

Area 41, 42 \Rightarrow Primary Auditory Area

Auditory pathway \Rightarrow Organ of Corti

\downarrow
Dorsal & ventral cochlear Nucleus (\oplus) in Medulla oblongata

\downarrow
Superior olivary Nucleus

\downarrow
Trapezoid body

\downarrow
Lateral Lemniscus

\downarrow
Inferior colliculus

\downarrow
Medial geniculate body

\downarrow
Auditory Radiation (Sublentiform part of Internal Capsule)

\downarrow
Area No. 41, 42 (Cortex)

Area No. 22 \Rightarrow Sensory Speech Area / Wernicke's Area

* Damage to 22 leads to \Rightarrow Auditory agnosia / word deafness

* Area 41, 42 damage \Rightarrow Deaf

Area No. 44, 45 \Rightarrow Broca's Area / Motor Speech Area

* Arcuate fasciculus / Uncinate fasciculus \Rightarrow Connects the Wernicke's & Broca's Area. (Connect Frontal to Temporal Lobe)

Area No. 4 \Rightarrow Motor Area

Funcⁿ \Rightarrow Initiation of Movements

* Large Pyramidal cells is k/a \Rightarrow "Betz cells"

Descending fibres

Corticospinal

Cortico-Nuclear



Area No. 4

Area No. 4

↓
- Internal capsule
(Posterior limb)

↓
Internal capsule (Genu)



Mid brain (Cerebrum)

Brain stem (Nuclei of the cranial Nerves)



Pons (Basilar part)



Medulla (Pyramids)



Spinal cord (Anterior horn cells)

Area No. 6, 8 → Pre-Motor Area

↳ execution of Movements

Area No. 9, 10, 11, 12 → Pre-frontal Area

↳ function ⇒ Intelligence; Memory; ego & self-respect
(Personality / social behaviour).

* Pterion ⇒ It is the Region where the Frontal; Parietal; temporal & sphenoid joined together.

- K/as the "weakest part of the skull".
- The Anterior division of Middle Meningeal Artery runs underneath the pterion.

* FRONTAL LOBE ⇒ It has following functional Areas: ⇒

i> 10 Motor cortex ⇒ Brodmann's Area 4;

ii> Premotor cortex ⇒ Areas 6, 8;

iii> Supplementary Motor Area ⇒ Area No. ⑥, ⑧

iv> Frontal eye field ⇒ Area No. ⑥, ⑧, ⑨

↳ Located in posterior part of Middle br. Gyrus.

v> Broca's Motor Speech Area ⇒ Area No. ④④, ④⑤

↳ Located in posterior part of inferior frontal gyrus.

vi> Prefrontal Area ⇒ Area No. ⑨, ⑩, ⑪, ⑫

* PARIETAL LOBE \Rightarrow i) Primary Somatosensory Cortex
 \Downarrow
Area No. (3), (1), (2)

ii) Somatosensory Association Areas \rightarrow

a) Superior Parietal Lobule \rightarrow Area No. (5), (7)

b) Supra Marginal Gyrus \rightarrow Area No. (46)

c) Angular Gyrus \rightarrow Area No. (39)

* TEMPORAL LOBE \Rightarrow i) Primary Auditory Area
 \Downarrow
Area No. (41), (42)

ii) Auditory Association Cortex (Secondary Auditory Area)

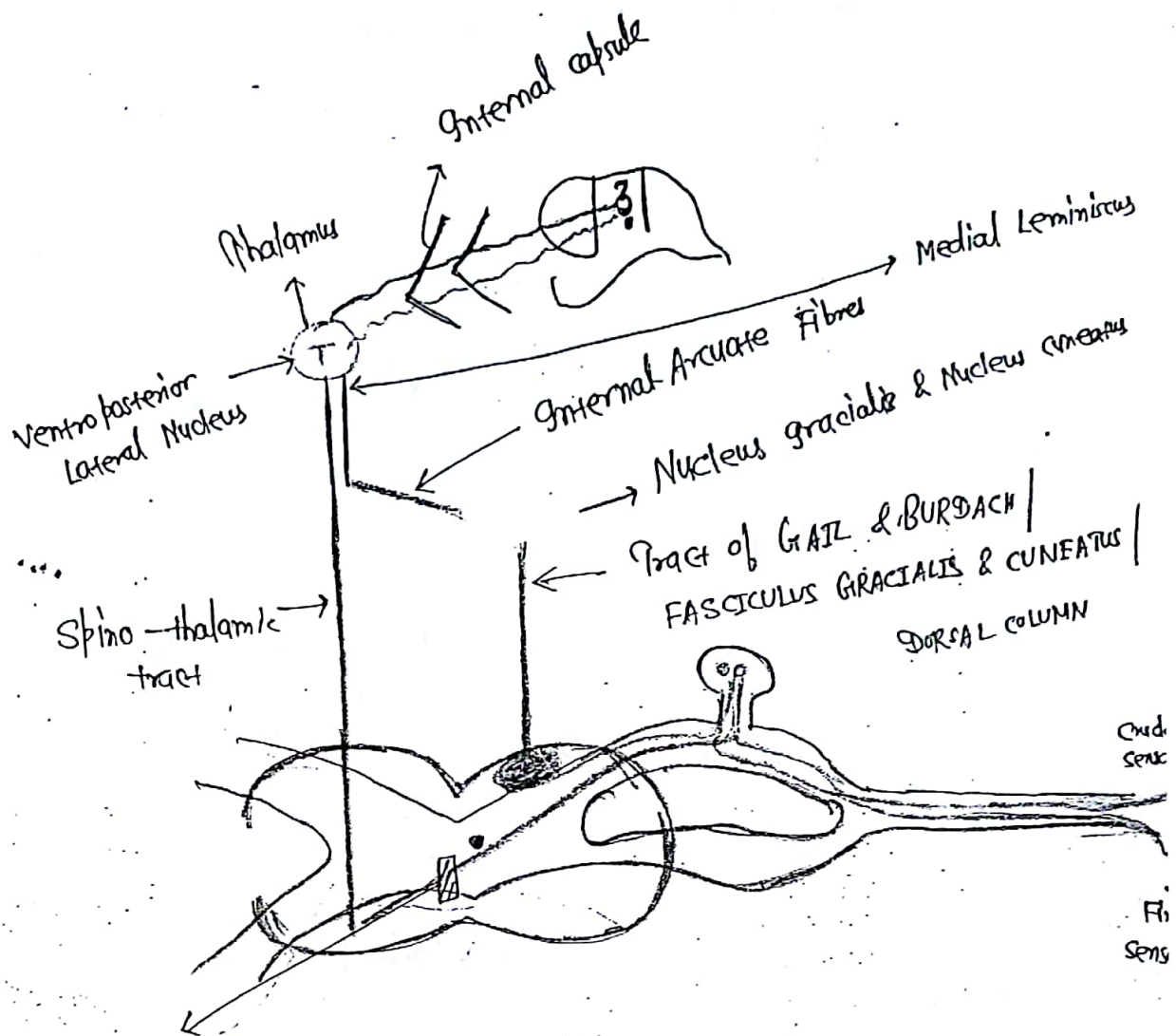
\Downarrow
Area No. (22)

- It includes Wernick's speech Area & is located in posterior part of Superior temporal gyrus

* OCCIPITAL LOBE \Rightarrow i) Primary visual cortex
 \Downarrow
Stroke Area; Area No. (17)

ii) Visual Association Areas

\Downarrow
Secondary visual Area; Area No. (18), (19)



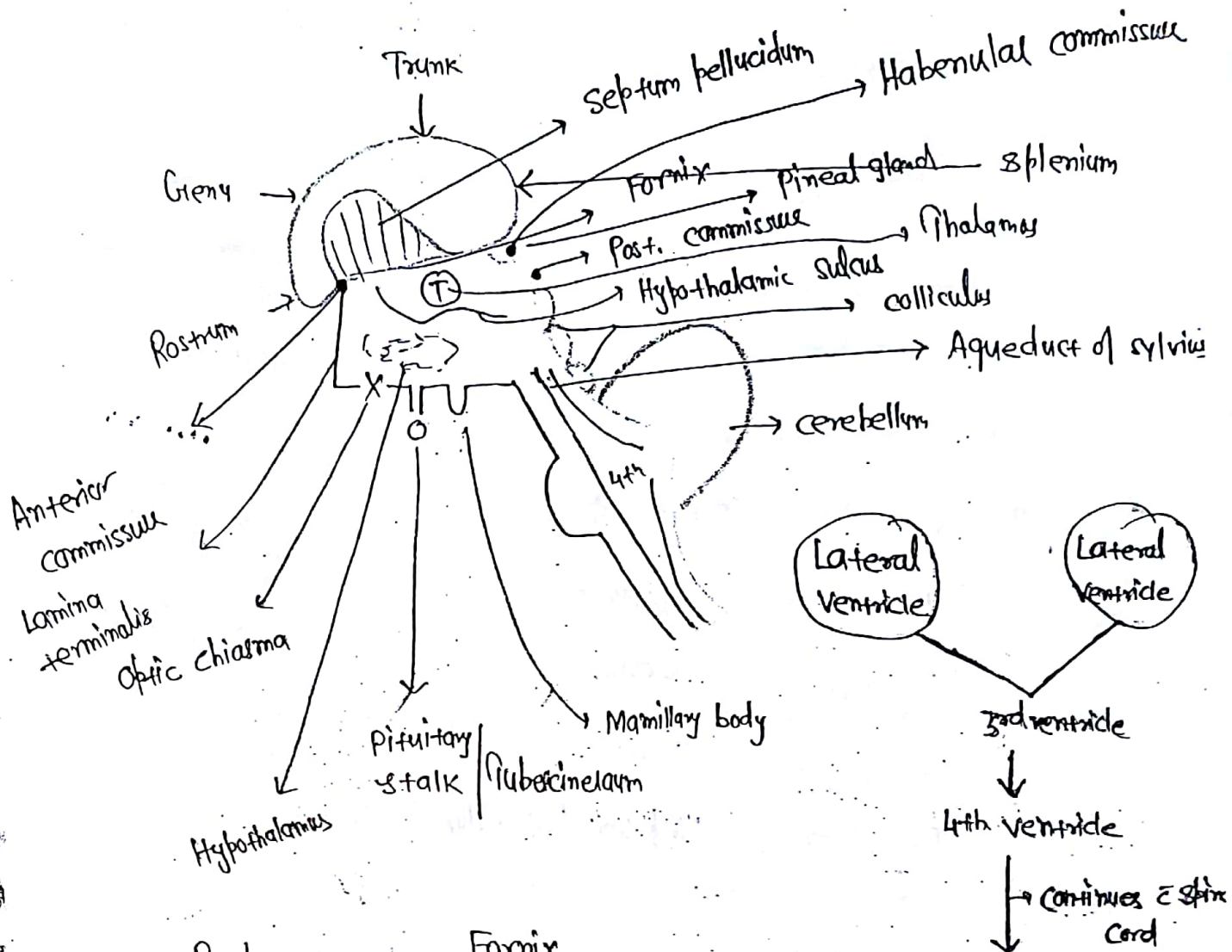
Syringomyelia

↳ Fine sensations are intact.

- All crude sensation are lost.

IIIrd ventricle

epithalamus \Rightarrow Habenular Commissure + Pineal gland + Post. commissure



Roof \Rightarrow Fornix

Floor \Rightarrow Optic chiasma; Pituitary stalk; Mammillary body

Ant. wall \Rightarrow Ant. Commissure & Lamina terminalis

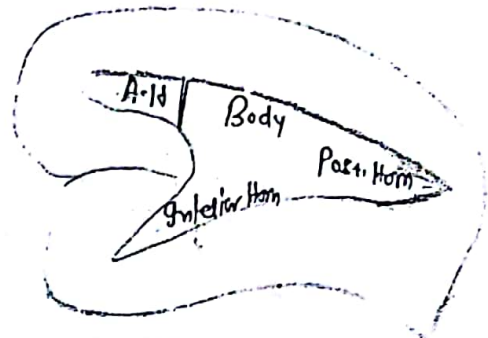
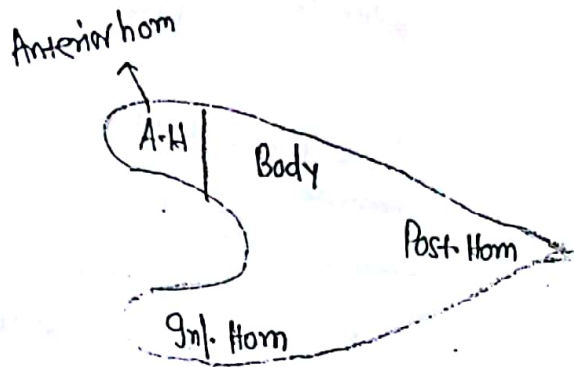
Post. wall \Rightarrow Pineal gland; post. commissure & habenular commissure

Lateral wall \Rightarrow Thalamus & hypothalamus

* Ventricles \Rightarrow There are the cavities in the brain lined by "Ependyma & CSF"

Parts :-

LATERAL VENTRICLE

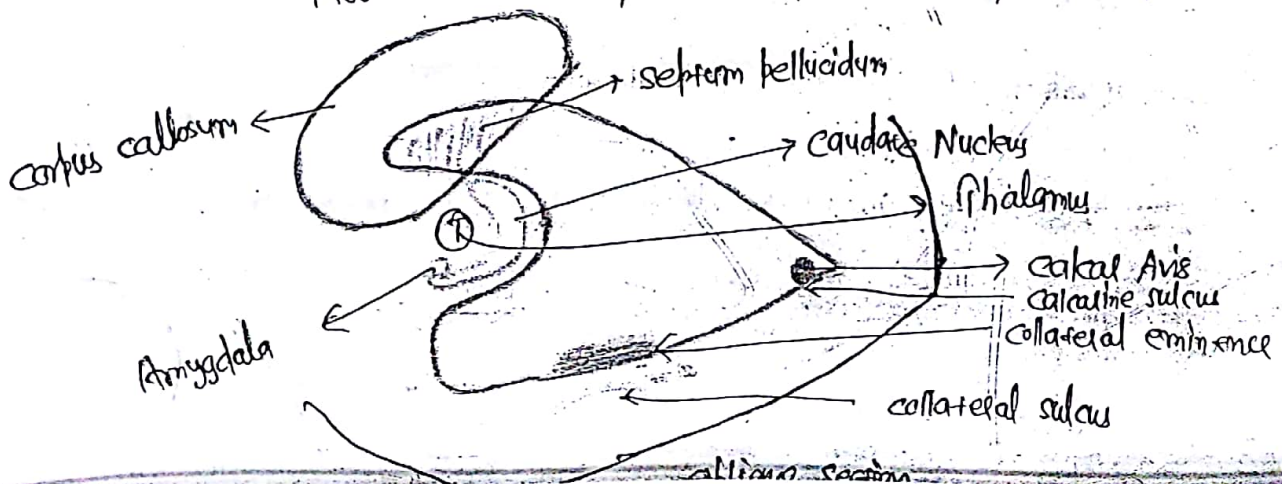


Relations of Anterior Horn :-

Floor \Rightarrow Rostrum
 Anterior \Rightarrow Geny
 Roof \Rightarrow Trunk
 Medial \Rightarrow septum pellucidum & fornix

Body of Lateral ventricle :-

Roof \Rightarrow Trunk
 Medial \Rightarrow Septum pellucidum & the fornix
 Floor \Rightarrow Medially thalamus & laterally caudate Nucleus



- * Posterior Horn & Ant Horn \Rightarrow Both has No choroidal plexus
- * Body & Inf. horn \Rightarrow have choroidal plexus.
- * Interventricular Foramina or Foramina of Monro \Rightarrow Connects 3rd ventricle to Lateral ventricle

COMPLETE SULCUS

- is the one which forms an elevation in the floor of the lateral ventricle

eg \Rightarrow calcarine Sulcus \Rightarrow Forms an elevation in the floor of Posterior Horn



Calcar Avis

Collateral Sulcus \Rightarrow Forms an elevation in the floor of Inferior horn



Collateral eminence.

* if both are in option \Rightarrow collateral > calcarine

* BLOOD SUPPLY OF BRAIN

(A) Vertebral Artery \Rightarrow Enters into the foramen transversarium of C6 vertebral

- crosses the Arch of Atlas & enters the skull through foramen Magnum

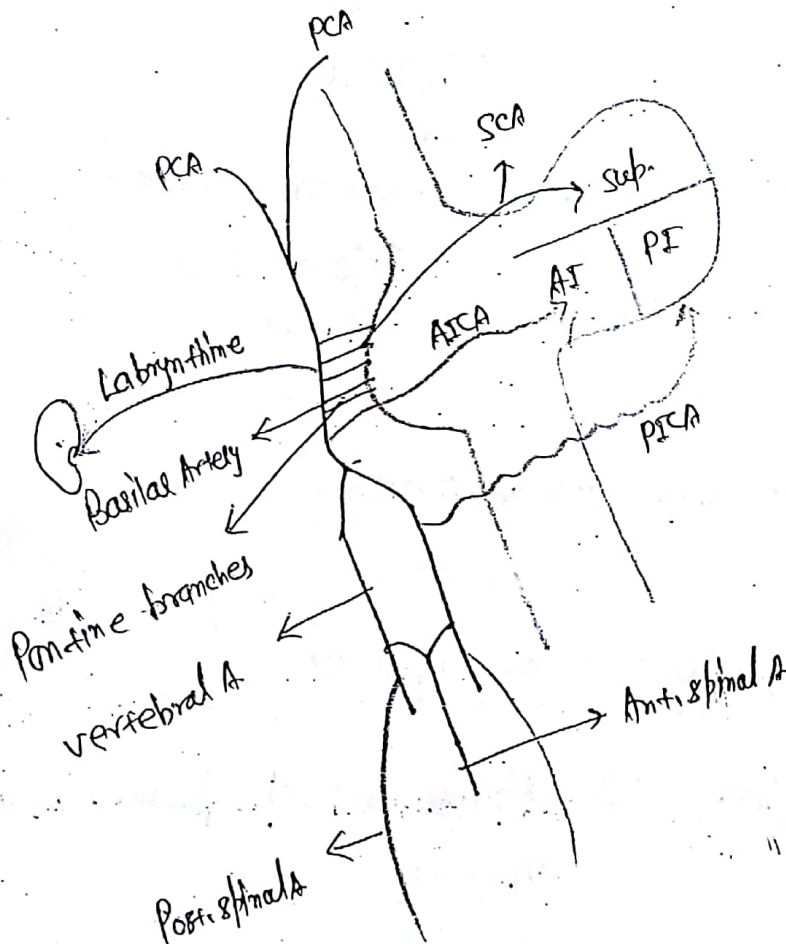
- Two vertebral joins to form Basilar Artery

Branches \Rightarrow Anterior spinal Artery
Posterior spinal Artery

③ Basilar Artery \Rightarrow Lies In Pons

branches \Rightarrow Pontine branches / Paramedian branches
supplies base of pons \Rightarrow damage cause of Hemiplegia

- Labyrinthine artery
- Ant. Inferior cerebellar artery
- Superior cerebellar artery
- Post. cerebral artery



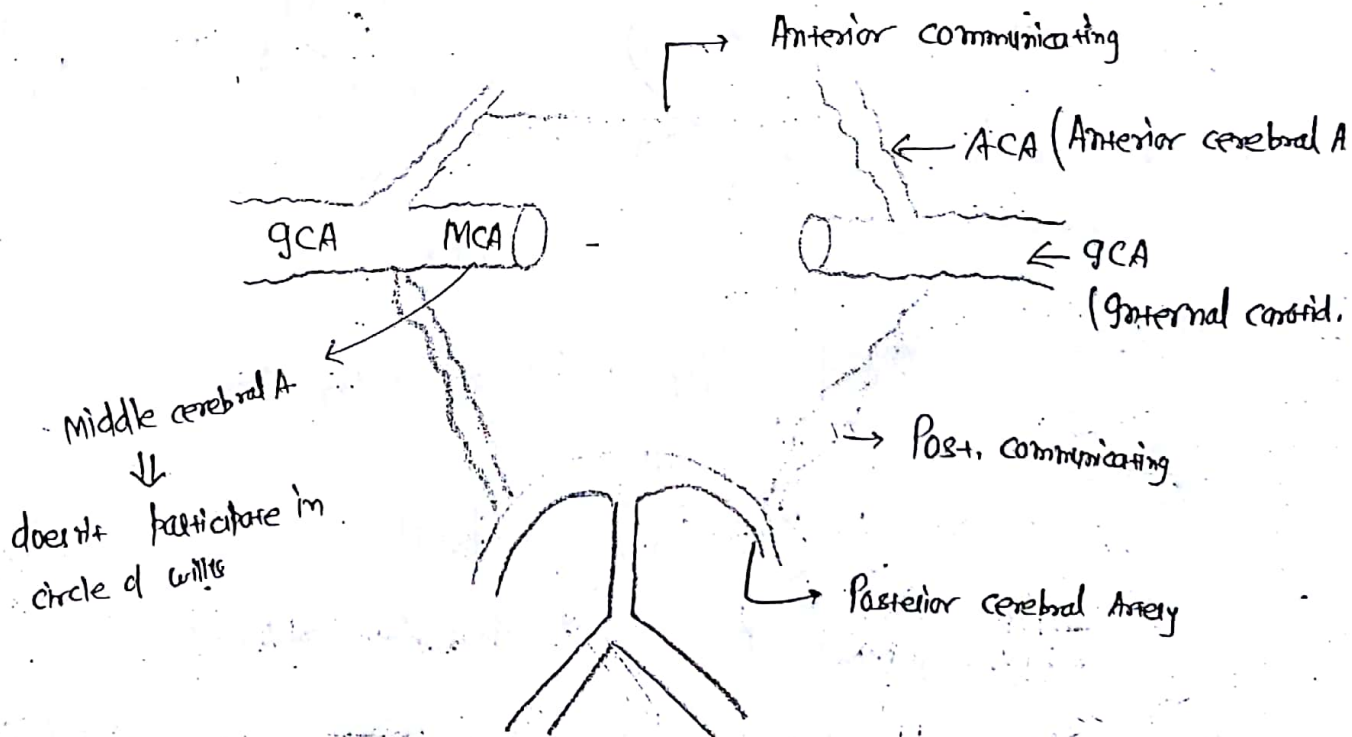
Internal Carotid Artery

- enters the skull through Foramen Lacerum

Branches \Rightarrow

- ① cavernous branches
- ② Hypophyseal branches (to pituitary gland)
- ③ Ophthalmic Artery (pass through optic canal & optic Nerve)
- ④ Ant. Choroidal Artery
- ⑤ ... Post. communicating Artery
- ⑥ 2 terminal branches $\begin{cases} \text{Ant. cerebral A.} \\ \text{Middle cerebral A.} \end{cases}$
 \hookrightarrow Continuation of Internal carotid

Circle of Willis



Circle of Willis

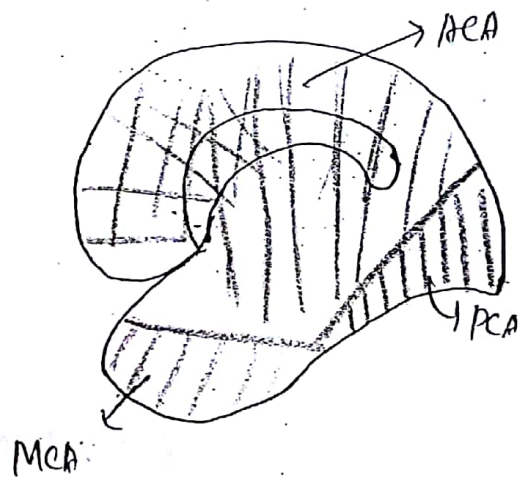
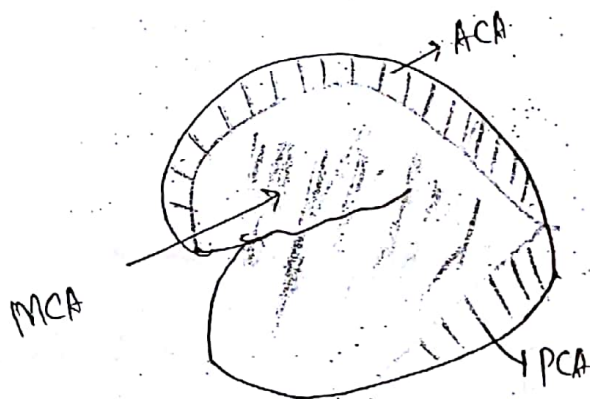
Cortical branches

- enters the sulci to supply surfaces of the brain

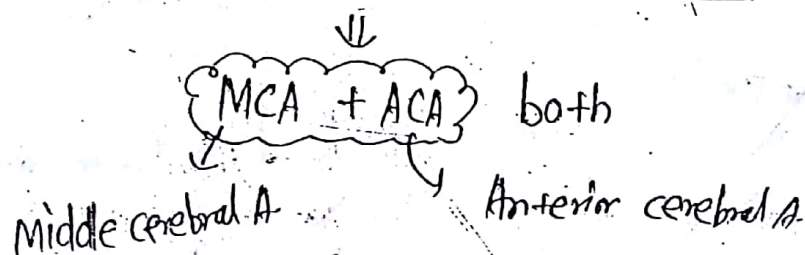
Central branches

- enters the substance of the brain to supply to deep Nuclei.

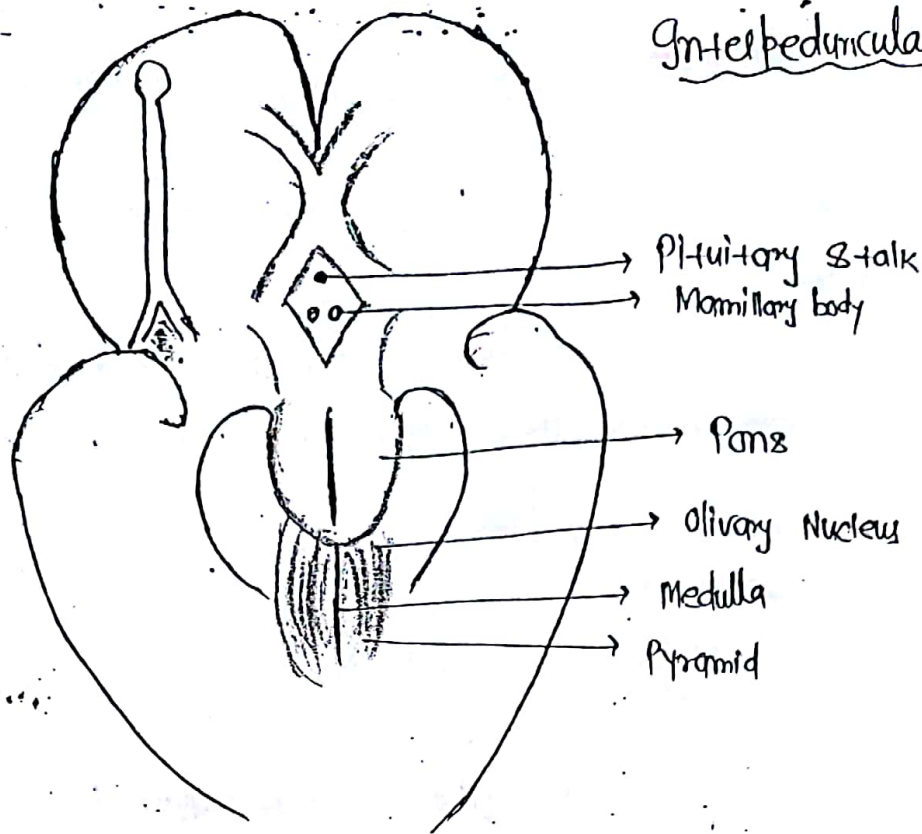
- Artery \oplus in Lateral Sulcus \Rightarrow MCA (Middle cerebral A)
- Artery \oplus in callosal sulcus \Rightarrow ACA (Anterior cerebral A)



Blood supply of Motor/sensory Area



Interpeduncular Fossa



Boundaries \Rightarrow Anterolateral \Rightarrow Optic tract
Postero lateral \Rightarrow Cerebrum
Floor \Rightarrow Pituitary stalk; Mammillary body
 & Posterior Perforated substance
Content \Rightarrow 3rd Nerve & Circle of Willis

VENOUS DRAINAGE OF BRAIN

1. Superficial vein \Rightarrow Superior cerebral vein



drains lateral surface of the brain & they open into the superior sagittal sinus.

Inferior cerebral vein



drains the inferior surface of the brain & they open into the cavernous sinus & sigmoid sinus.

Anterior cerebral vein



Lies in the callosal sulcus along \bar{c} Anterior cerebral Artery

Middle cerebral vein



Superficial Middle cerebral



Communicates Medially \bar{c} cavernous sinus & laterally \bar{c} Superior sagittal & transverse sinus

Deep Middle cerebral



- Lies deep in the lateral sulcus along \bar{c} MCA
- Anterior cerebral; the deep middle cerebral & straight veins join to form Basal vein.



Drains into Great cerebral vein of Galen

2. Deep vein \Rightarrow

Internal cerebral vein

\Downarrow

- Formed @ Intel ventricular foramen by joining of
 - T - Thalamostriatal vein
 - C - choroidal vein
 - S - septal vein

- The two internal cerebral veins join to form Great cerebral vein of Galen

\hookrightarrow drains into Stria~~ga~~ sinus

- The Basal vein drains into Great cerebral vein.

THE BRAIN

IVth Ventricle

- Roof \Rightarrow Formed by cerebellum
- Floor \Rightarrow Lower half of the pons & upper half of the Medulla
- Facial colliculus \Rightarrow Formed by fibres of Facial Nerve as they wind around the Abducent Nerve Nucleus
- Hypoglossal $\Delta \Rightarrow$ Formed by hypoglossal Nerve Nucleus
- Vagal $\Delta \Rightarrow$ Formed by dorsal Nucleus of vagus

BRAIN STEM

- Only Cranial Nerve ; which emerges from dorsal aspect of brain stem
 \Downarrow
Trochlear (Phineas + cranial Nerve)
- The Nerve which undergo complete decussation before emerging
 \Downarrow
Trochlear Nerve
- Pregnant Nerve \Rightarrow Nerve having artery within it.
 - \hookrightarrow eg \Rightarrow Optic Nerve \Rightarrow contains central A. of Retina
 - Sciatic Nerve \Rightarrow branch of inferior gluteal
- * Medial Most N. attached to Ponto-Medullary Junction \Rightarrow
- * Lateral Most

Nerve attach @ the junction of Pons & Middle cerebral Peduncle



Trigeminal Nerve

FUNCTIONAL COMPONENTS OF NUCLEUS

① Special visceral efferent :-

| <u>Nerves</u> | | <u>Nucleus</u> |
|---------------|---|-----------------------------------|
| 5 | → | Motor Nucleus of Trigeminal Nerve |
| 7 | → | Motor Nucleus of Facial Nerve |
| 9 | } | Nucleus Ambiguus |
| 10 | | |
| 11 | | |

② General visceral efferent :-

| <u>Nerves</u> | | <u>Nucleus</u> |
|---------------|---|-------------------------------|
| 3 | → | Edinger - Westphal Nucleus |
| 7 | → | Sup. salivatory & Lacrimatory |
| 9 | → | Inf. salivatory |
| 10 | → | Dorsal Nucleus of vagus |

③ General Somatic efferent \Rightarrow

Nerve

Nucleus

3



Oculomotor N. Nucleus

4



Trochlear N. Nucleus

6



Abducent N. Nucleus

12



Hypoglossal N. Nucleus

④ Special visceral Afferent \Rightarrow

④ In 7, 9 & 10th Cranial Nerve



Nucleus of tractus solitarius

⑤ General visceral Afferent \Rightarrow

10th Nerve (Vagus);

⑥ Special Somatic Afferent \Rightarrow present in

1st C-N

2nd C-N

8th C-N

⑦ General somatic afferent \Rightarrow carried by trigeminal Nerve;

its three Nuclei → 1st Mesencephalic Nucleus

↳ parts in mid brain

b) Chief Sensory Nucleus → prt. in Pons

c) Spinal Nucleus → prt. in Medulla

No. of Nucleus of Trigeminal Nerve ⇒



WHITE MATTER OF THE BRAIN

Commissural fibres

- Connects similar areas in the opposite hemisphere

eg ⇒ Corpus callosum

Ant. commissure

Post. commissure

Hebenuar commissure

Projection fibres

- they project outside the brain

eg ⇒ Internal capsule

Association fibres

- connect different area in same hemisphere

eg ⇒ Uncinate fasciculus

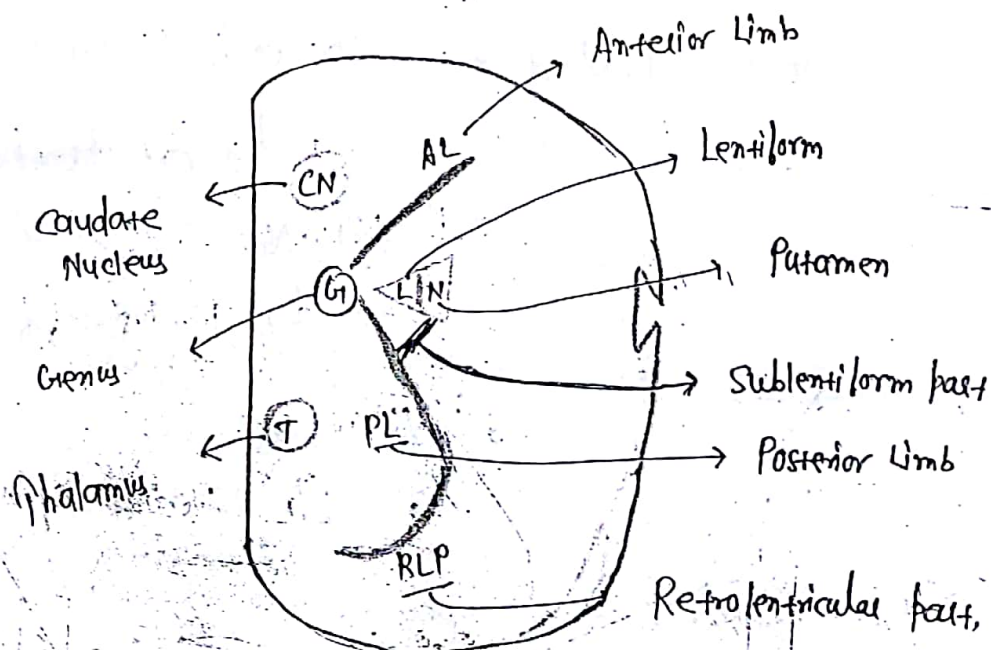
INTERNAL CAPSULE

Parts →

- Anterior Limb (Lies b/w caudate Nucleus & Lenticular Nucleus)
- Genu
- Posterior Limb (Lies b/w the thalamus & Lenticular Nucleus).
- Retrolenticular part; lies behind Lenticular Nucleus
- Sublenticular part; lies below Lenticular Nucleus

| | | | | |
|-----------------------------|------------------|----------------|-------------------------------------|-----------------------------------|
| AL | G | PL | RLP | SLP |
| Ascending ⇒ Thalamo-bulbar | Thalamo-Parietal | | Thalamo-occipital (Optic Radiation) | Thalamo-temporal (Auditory Radi.) |
| Descending ⇒ Fronto-pontine | Cortico-Nuclear | Cortico-spinal | Occipito-pontine | Temporo-pontine |

* Main A. Supplying the Internal capsule ⇒ Middle cerebral



* Medial Medullary Syndrome | Alternating Hypoglossal Hemiplegia

- Thrombosis of Vertebral Artery;
- Structures Involved → Hypoglossal Nucleus
 - ↳ I/L Paralysis of Tongue
- Corticospinal tract
 - ↳ C/L hemiplegia
- Medial Lemniscus
 - ↳ C/L Loss of Fine sensation,

* Milard-Gubler Syndrome

- Thrombosis of Paramedian branches of basilar arteries;
- Structures Involved → Corticospinal tract
 - ↳ C/L hemiplegia
- 7th Nerve "
 - ↳ I/L Paralysis of Face
- 6th Nerve
 - ↳ I/L Medial squint.

WEBER'S SYNDROME

— Thrombosis of Post. cerebral Artery.

Structures Involved \Rightarrow ① Cortico-Spinal tract

\hookrightarrow C/L Hemiplegia

② 3rd Nerve

\hookrightarrow I/L Lateral squint & Diplopia;

Ptosis;

Pupils are dilated & fixed

CEREBELLUM

* Fibres coming to the cerebellum

\swarrow
Climbing fibres



Arises from the Inferior
olivary Nucleus

— Stimulates Purkinje cells

\searrow
Mossy's fibre



Arises from spinal cord;
vestibular Apparatus & Cere-
bellum

— Stimulates granule cells



Stimulates Purkinje cells

\swarrow
It inhibits the deep cerebellar Nucleus & Lateral vestibul
Nucleus

INFERIOR CEREBELLAR PEDUNCLE

Afferent fibres →

Posterior spino cerebellar ;

Olivocerebellar ;

Vestibulocerebellar ;

Reticulocerebellar ;

Cuneocerebellar (carries unconscious proprioception from upper limb)

Efferent fibres →

Cerebellum - vestibular

Cerebellum - Reticular

Cerebellum - Olivary

MIDDLE CEREBELLAR PEDUNCLE

Afferent fibres →

Ponto-cerebellar

SUPERIOR CEREBELLAR PEDUNCLE

Afferent fibres →

Ant. spino-cerebellar

tecto-cerebellar

Hypothalamo-cerebellar

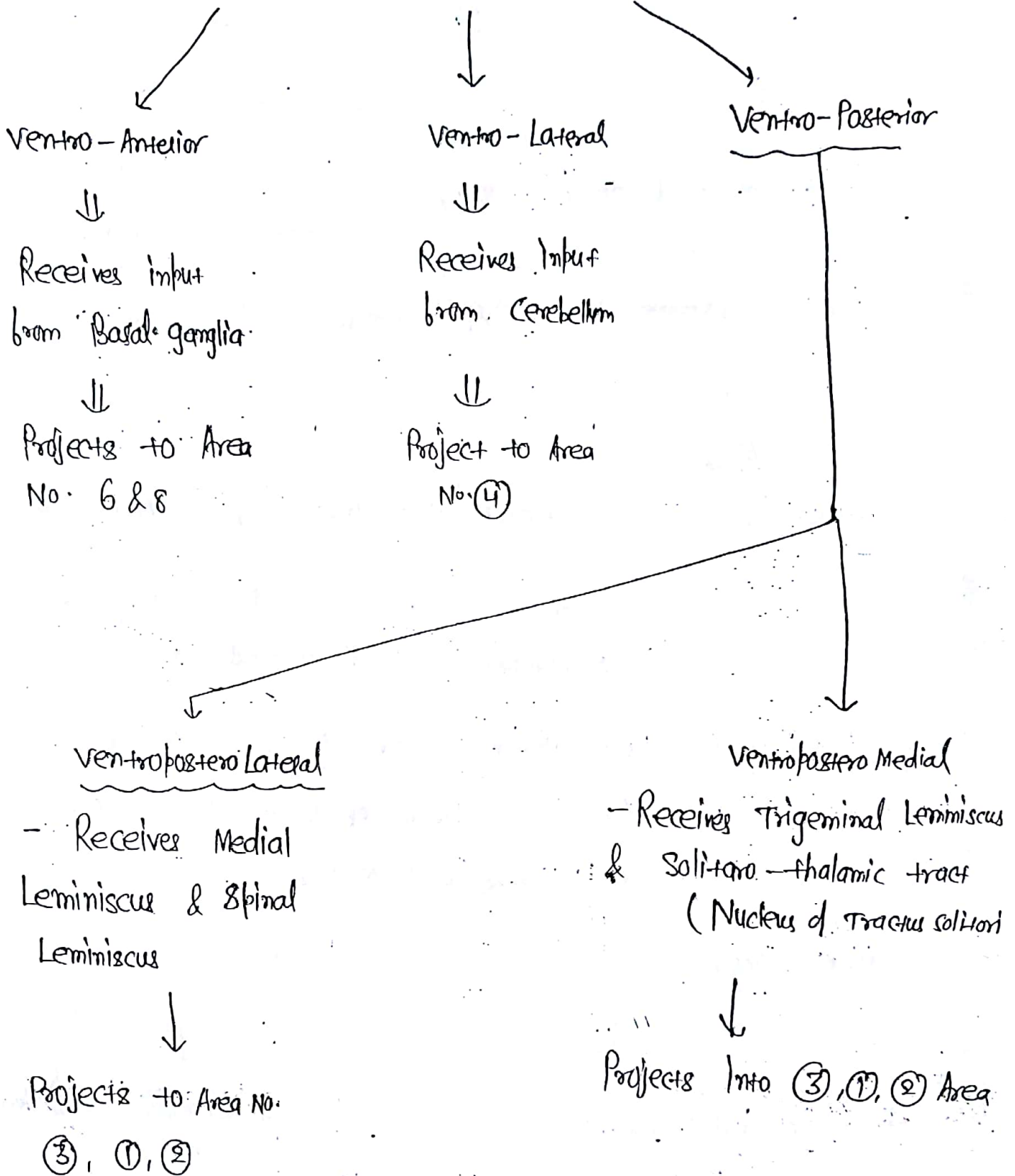
Efferent fibres →

Cerebellum - Rubral

Dentato - Rubral & Dentato - thalamic

THALAMUS

Ventral group of Nucleus



* SPINAL CORD

DORSAL HORN :

Substantia Gelatinosa : 2nd order Neuron for crude Sensation :

Nucleus Proprius : Receives conscious Proprioception ;

Nucleus dorsalis | Clarke's column : Receives Unconscious Proprioception from trunk & Lower limbs ;

Visceral Afferents : Receives sensation from visceral organs.

VENTRAL HORN :

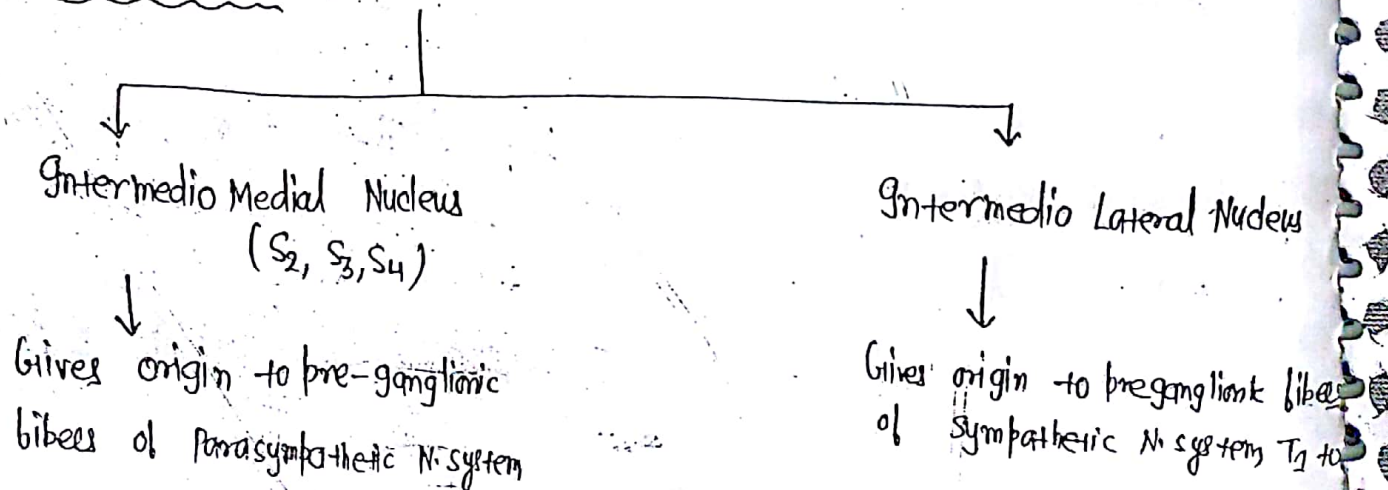
Medial group : Innervates the Muscle of the Neck & the trunk

Lateral group : present in the cervical & Lumbosacral enlargement of the spinal cord

Central group :

- a) Phrenic Nerve Nucleus = C₃ - C₅
- b) Spinal Nucleus of Accessory Nerve = C₁ - C₅
- c) Lumbosacral Nucleus

LATERAL HORN :



REXED LAMINA

- System of ten layers of grey Matter.

1 → Postermarginal Nucleus

2 → Substantia Gelatinosa

3 & 4 → Nucleus Proprius

5 & 6 → Base of dorsal column

7 → Nucleus dorsalis; Nucleus of Lateral horn

8 & 9 → Nuclei of Anterior grey column

10 → Surrounds the central canal.

* HEUBNER'S Artery ⇒ Recurrent branch of Anterior cerebral;

* CHARCOT'S Artery ⇒ Striate branch of Middle cerebral

NEET 16
* The cerebral cortex contains 5 types of Neurons ⇒

i> Purkinje cells

ii> Granule cells;

iii> Basket cells;

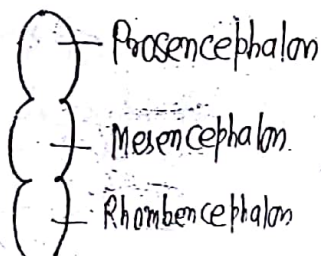
iv> Stellate cells;

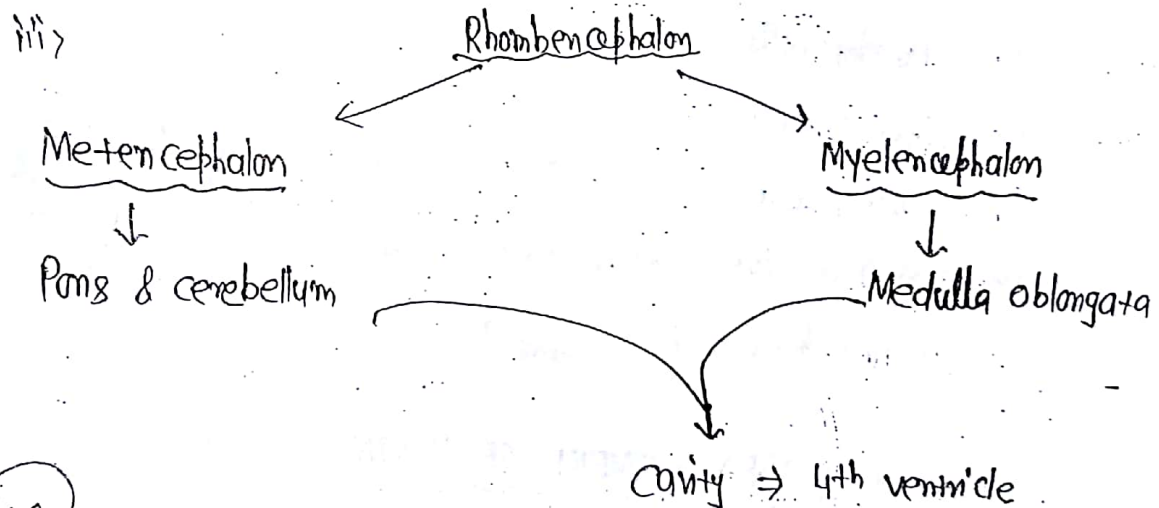
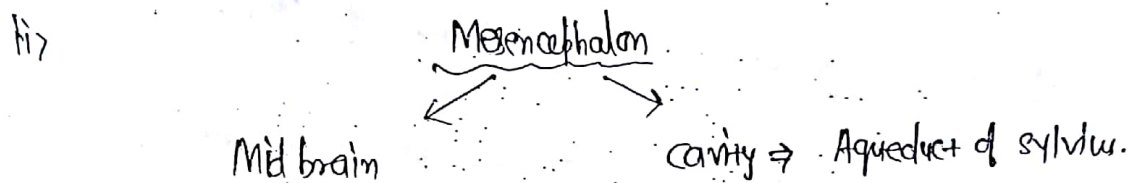
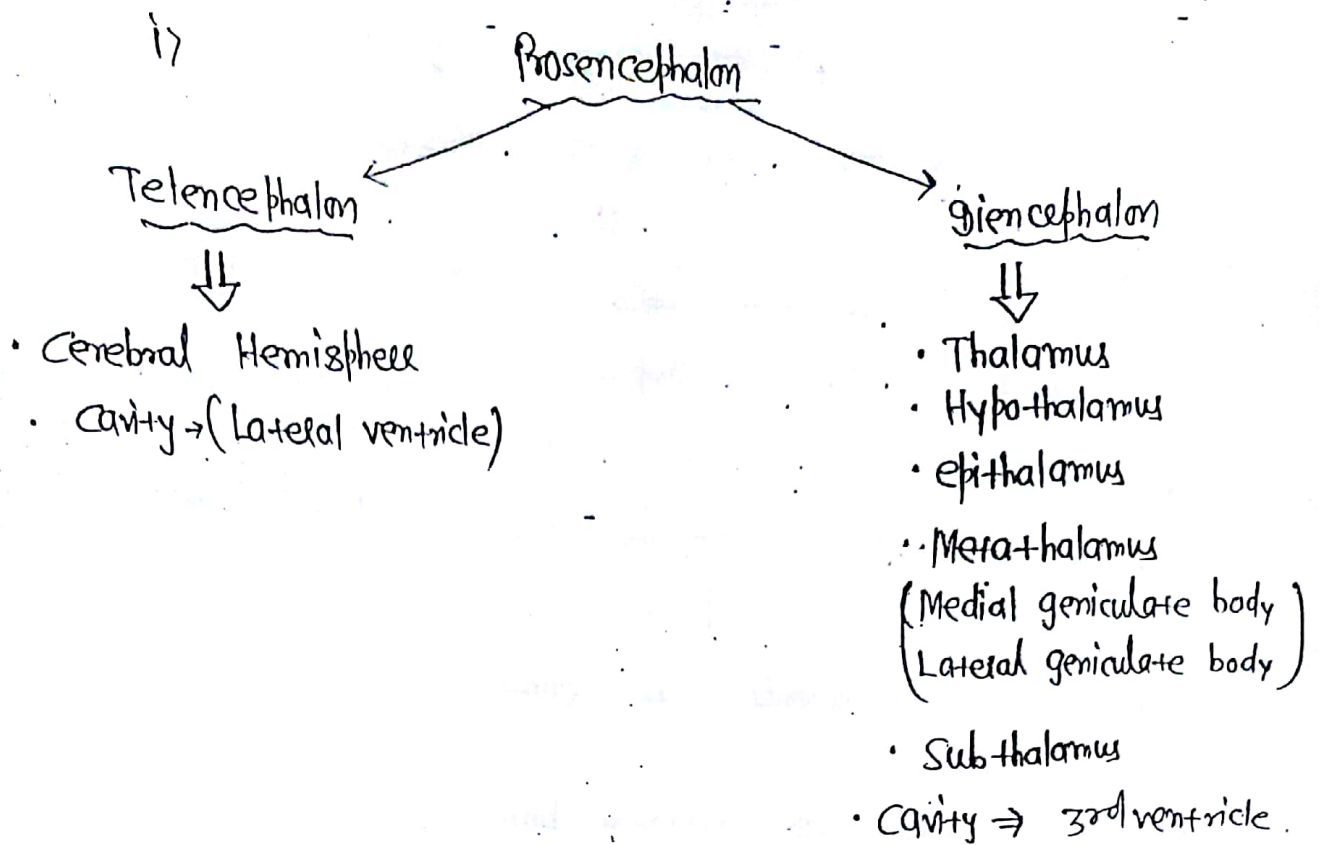
v> Golgi cells.

* DEVELOPMENT OF BRAIN

Structures formed from Neural tube are ⇒

(A) From cranial part of Neural tube ⇒ Give Rise to "Brain"





NEEDS
⑤

From caudal part of Neural tube → Give Rise to "Spinal cord".

- * Cell Nest is characterized of \Rightarrow Hyaline cartilage
- * Largest size of chondrocytes are seen in \Rightarrow Elastic cartilage
- * Smallest size of chondrocytes are seen in \Rightarrow White fibro cartilage

eg \Rightarrow Intervertebral disc
Articular disc
Menisci

- * Apocrine gland \Rightarrow eg \Rightarrow Sweat gland
- Holocrine gland \Rightarrow eg \Rightarrow Sebaceous gland
- Merocrine/eccrine gland \Rightarrow eg \Rightarrow Mammary gland

Simple coiled tubular
type of gland; which
unbranched duct.

- * eg of Serous Salivary gland \Rightarrow eg \Rightarrow Parotid gland
- Mucous Salivary gland \Rightarrow eg \Rightarrow Sublingual gland
- Mixed salivary gland \Rightarrow eg \Rightarrow Submandibular gland



MUCOUS ACINUS



SEROUS ACINUS



MIXED ACINUS (Demicrine)

* Lymphoid follicles are abt. in \Rightarrow Thymus
 \Downarrow

Hassall's corpuscles are characteristic of it.

* Spleen contain Red & white pulp \bar{c} eccentric Arterioles.

* Tonsil contains crypts & epithelium is "Stratified" ^{Squamous} Non-keratinized Epithelium.

* Lymph Node \Rightarrow Subscapular sinus

* Gall bladder \Rightarrow simple columnar \bar{c} brush border.

* PCT \Rightarrow Lined by simple cuboidal \bar{c} brush border

Ansa Nephron \Rightarrow Lined by simple squamous epithelium
(Loop of Henle)

* Goblet cells are abt. in \Rightarrow Esophagus

\Downarrow
Plenty in colon

\Downarrow
Submucosal Glands $\oplus \Rightarrow$ Lubricates the esophagus

* Toughest Layer of esophagus \Rightarrow Submucosa

* Lining epithelium of secreting thyroid follicle \Rightarrow simple cuboidal

* Germinal epithelium \Rightarrow simple cuboidal

* Respiratory epithelium \Rightarrow Pseudo stratified ciliated columnar \bar{c} goblet cells

* Internal elastic Lamina \Rightarrow characteristics of Muscular Artery.

TYPE OF EPIPHYSIS

↳ Part of bone which develop from 2'

1. Pressure epiphysis ⇒ Seen @ - ossification center.
- the ends of long bone subjected to pressure

↳ eg ⇒ Head of Humerus; aa
Head of Femur; aa
condyles of tibia; aa

2. Traction epiphysis ⇒ Form d/t pull of the Muscle

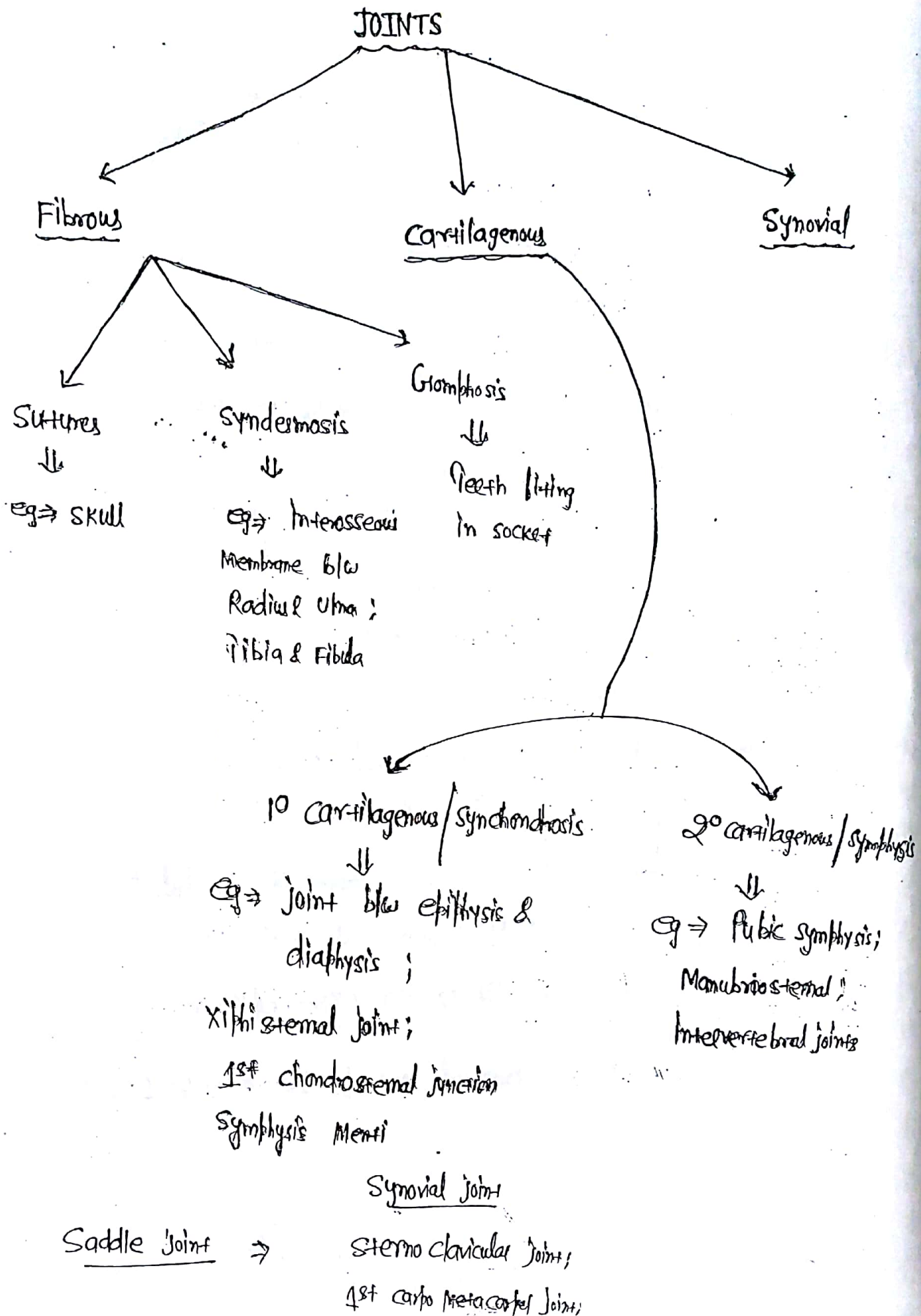
↳ eg ⇒ Tubercle; a
Trochanter; a
Mastoid process; a
Tibial tuberosity.

3. Atavistic epiphysis ⇒ Functional in Lower Animals & degenerate in Humans

↳ eg ⇒ Coracoid process of Scapula a
OS trigonum of Talus

4. Aberrant epiphysis ⇒ It is an extra epiphysis

↳ eg ⇒ Proximal end of 1st Metacarpal bone aa



Condylar Joint \Rightarrow

TM Joint; Atlanto-occipital Joint;

Metacarpopharyngeal Joint

ellipsoidal Joint \Rightarrow

Wrist

Pivot Joint \Rightarrow

Superior & inferior Radio-ulnar Joint;

Atlanto-axial Joint

Plane Joint \Rightarrow

Intercarpal; Inter-tarsal; Acromio-clavicular;

Hinge \Rightarrow

Elbow; Ankle

